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"I cannot help plead to my countrymen, at every opportunity, to cherish all that is manly and noble in the military profession, because Peace is enervating and no man is wise enough to foretell when soldiers may be in demand again."—SHERMAN.

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READINESS FOR WAR.

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IN the old translation of St. Luke's gospel we are told that at the birth of Christ the hosts of heaven announced "On earth peace, good will toward men." In the recently revised version of the gospel the Christmas announcement of the angels reads: "On earth peace among men, *in whom He is well pleased.*" The early Christian fathers taught that war of any kind was contrary to the revealed will of God. In consequence, the Roman soldiers who became Christians deserted in crowds. Soon this doctrine threatened to result in the entire extinction of Christianity, and St. Augustine was called upon for advice. Following his opinion, the church decided to excommunicate soldiers who deserted even in time of peace. From that time until the present, the history of Christian peoples consists largely of the narration of wars, and the consideration of their causes and consequences.

Many are still of the opinion that Christianity teaches that wars are unjustifiable, even in self-defense. Prior to the Rebellion, the so-called Peace Doctrine was quite prevalent in this country among those who afterwards became strong supporters of war for the preservation of the Union.

Among the ablest advocates of peace was Professor Francis Wayland, who in his "Elements of Political Economy," published over half a century ago, referring to the advantages of gunpowder in war, says:

"The more energetic are the means of destruction in war, the less is the loss of life in battle. * * * This might almost give rise to the paradoxical hope that some means of destruction might yet be invented, so overwhelming in its effect as to put the smallest number of men on a level with the greatest, and hence to put an end to wars altogether." With similar reasoning, Lord Lytton, in "The Coming Race," by a flight of imagination, makes the tremendous energy he calls "vril" put an end to war. Means of destruction much more potent than any known to either of these thinkers have been discovered, and yet the dreams of enforced peace do not promise to be soon realized.

Since the Thirty Years' War, numerous plans for securing perpetual peace have been proposed. How visionary are such plans appears when we reflect that there is not a State of any significance on the face of the globe that has not been involved in war during the present century; that armies and navies were never so large or so formidable as at present; and that there is hardly a nation that has not now the clouds of war hovering above its political horizon.

In our own country the New York Peace Society, organized in 1838, with a numerous and respectable following, failed to avert either the Mexican or Civil War. The plan for a Court of Arbitration proposed by Mr. David Dudley Field a quarter of a century ago, and recently revived, is still open to the objection noted by Professor Woolsey, that—

"There seems to be no provision for the event of a member refusing to obey the arbitrators' sentence. * * * In any plan a danger would arise from the more powerful members resisting the decrees of the Court or making it their instrument. Moreover, as Phillimore says, 'a State may feel that the contested right is one of vital importance, and one which she is not justified in submitting to the decision of any arbiter or arbiters.'" Vattel regarded arbitration as "a reasonable and natural mode of deciding such disputes as do not directly interest the safety

of a nation." This last seems to be the opinion of many of those who attended the late convention held in the interest of International Arbitration. Indeed the recently proposed treaty of general arbitration with Great Britain is reported not to cover "such extraordinary event as an insult to the flag or any other national indignities which are considered outside the scope of arbitration."

That too much should not be expected from this treaty must be apparent from the recent speech of the Marquis of Salisbury in the House of Lords, in which he does not claim "that it will remove the greatest risks of war."

Medical and surgical science, and increased knowledge of sanitary laws, are steadily alleviating human suffering, but sickness, pain and sudden death remain. The improvements in agriculture, the growing ease of the conveyance of food products, and the opening up of new grain areas, have lessened the danger arising from crop failures, and yet to-day millions are starving in India. Religion, ethics, education and better government are undoubtedly making the world grow better, but crime still continues. So, too, in spite of religious and moral teaching, of resort to arbitration to settle international disputes, and of the great progress being made in producing destructive agents, wars still threaten, and armies and navies must be maintained. It seems very probable that as long as the pious shall have reason to pray for deliverance from plague, pestilence and famine, and from murder and sudden death, they will have occasion to continue to beseech deliverance from battle as well.

In the *Century Magazine* for January, 1897, Mr. Godkin attempts to set forth the absurdity of war, and holds that, if people would act "like men and not like animals," wars need not occur.

It may be conceded that at least one of the parties to a national controversy is acting contrary to right reason; but human actions are governed by considerations of *expediency* as well as of right. When all men shall be led to seek the right, and arbiters can be relied upon to ascertain and award the right, wars will assuredly be absurd and probably will cease. Meanwhile it is idle to attempt to convince men that war in support of some high principle—such as freedom, national honor or

national existence—even against the greatest odds, is either absurd, or as ridiculous as are the fights of cats and dogs.

Perhaps no more instructive example can be produced than the attempt of Prussia in 1856–57 to exercise sovereignty over the Swiss canton of Neuchatel. Prussia's claims rested upon what had been guaranteed to her by the Congress of Vienna. The Swiss confederation determined to resist this attempted blow at her liberties. Prussia mobilized an army of 300,000 men to crush the apparently insignificant power opposing her. Switzerland, however, in January, 1857, marched an army of 30,000 men to the Rhine frontier. No better troops than these Swiss existed in Europe, and they were led by one of the grandest soldiers and patriots—the then aged General Dufour. Louis Napoleon, who, greatly to his credit, had attempted mediation and failed, now called a Congress of the representatives of the Great Powers, to meet in Paris, to consider the matter in dispute. The Congress of Paris decided against Prussia, who unwillingly abandoned her claim.

Here was a triumph of right obtained by peaceful means; but who can deny that, had Switzerland not been in readiness to fight, matters would have gone quite differently? Who will say that, had war been forced upon Switzerland—even with greater chances of failure than actually threatened that noble little state—her resistance to Prussia would have made her absurd? If war under such circumstances is absurdity, then truly the absurd borders closely on the sublime.

Man is undoubtedly making rapid progress, intellectually. He is, we believe, advancing morally. Physically he has certainly not gained, if indeed he has not lost in comparison with his ancestors; but he is vastly more powerful through his control of nature than ever before. He is growing less like the lower animals, but he has not parted with any of that courage and pugnacity that, combined with higher intelligence, gave him supremacy over all other creatures. When he does, he will cease to be human.

War brings in its train so much of suffering, so much that is terrible, that it is naturally and justly viewed with horror, and no nation should engage in it unless to prevent a greater evil; but it is nevertheless "frequently in the hands of Providence,

the means of disseminating and establishing civilization." Just as, without some knowledge of pain, pleasure would pall; without suffering, there would be no call for sympathy; without darkness light would be less satisfying, so we may well conceive that without war the blessing of peace would lose much of its fullness. Nor should it be overlooked that wars have done as much if not more than missionaries to spread religion, and more than all the peace societies toward making and cementing friendships. Soldiers have possibly done as much for civilization and the welfare of humanity as priests or statesmen, and abundantly more than peace-loving wealth accumulators. It needs but calm and unprejudiced reflection to convince any intelligent thinker, that the most dreadful war of modern times—our own civil war—was in many respects a great blessing to the whole country.

There is much wisdom in the words of General Sherman, quoted in every copy of the JOURNAL OF THE MILITARY SERVICE INSTITUTION, "Peace is enervating, and no man is wise enough to foretell when soldiers may be in demand again."

Despite all reasoning to the effect that war is unnecessary as well as wicked, the fact remains that in some form it threatens the well being, if not the existence, of every state. It follows therefore that it is the duty of every state to be prepared for war—just as it is the duty of municipalities to provide efficient means to protect the persons and property of their citizens.

The first duty of the practical statesman is to advance the interests of his own country. The love of country, like other forms of human love, is not unfrequently accompanied by selfishness, and the disregard of others' rights. Often, the richer a man grows, the more anxious he is to accumulate property, and so it is with states. In the struggle for power, aggressions necessarily occur; and, unless capable of defending its rights, the state encroached upon will, soon or late, become a mere dependency, or cease to exist. "The weakest go to the wall and the strongest survive everywhere."

History also teaches us that even the best administered government may incur the enmity of certain classes within its own territorial limits. Indeed, in every state men are to be found, to whom all order and all laws are hateful, who plot and work in the dark to overturn the existing state of society, who shrink

not from detestable crimes, and who can be restrained only by the fear of a power which they cannot oppose and live.

Nor does a state fulfil its destiny by remaining passive regarding the actions of other states among each other. Great as is the evil of intermeddling, individuals must sometimes interfere in the affairs of others in the interest of innocence and virtue, or be failing in duty, and fit only to be classed among dastards. So, too, a state may be lacking in duty, if not ready when called upon, to interfere to prevent injustice and oppression; and thus may forfeit the respect not only of other states, but also of its own citizens.

A nation known to be prepared to resist aggression, and to suppress insurrection, will be much more liable to immunity from foreign and domestic war than one not so prepared. Further, the voice of a nation strong in arms, when intervening in the cause of justice or humanity will scarcely pass unheeded. Whether as a party to an international dispute, or merely as a mediator, a nation strong for both offense and defense, asking for arbitration, will succeed where a weaker nation would fail. In the interest of peace alone, it therefore behooves a nation to be at all times ready to take up arms promptly and effectively.

Should war be inevitable, the lot of a nation not in readiness is truly to be deplored. Disaster and humiliation are certain. If it has resources, it may rally, and may eventually be the victor; but the cost to national standing, in wealth, and in lives, will, in all likelihood, be fearful. Nor must it be imagined that vast numbers of men—even of men inspired to the highest degree with courage and patriotism—, and abundant supplies of arms, ammunition and stores of all kinds, constitute readiness. The men must be organized, instructed and disciplined before they become useful. Modern ordnance, and even small arms, require expert knowledge in the handling. Fortifications and gun emplacements must be built slowly; and expensive plants, special technical skill and much time are necessary to construct heavy ordnance and to build ships of war. Special information is needed to successfully manipulate the various supply departments. It is not sufficient that the general officers have served in great wars in subordinate positions. They must be experienced in actually handling large bodies of troops.

It is necessary but to examine briefly recent history, in order to be convinced of the importance of a state being in readiness for war.

In 1866, Austria was involved, at the same moment, in war with both Prussia and Italy. On a war footing she could, including reserves, call into the field 700,000 men. She actually succeeded, after much effort in equipping about 500,000, of which about 220,000 were destined for Bohemia. When Prussia commenced the war, but half the Austrian regiments had reached the positions designed for them. The infantry was armed with the Lorenz rifle—a muzzle loader. Its training seems to have been excellent; its discipline is described as belonging to a "crushing system," which sacrifices individuality to collective value. The judicial authority of the colonels who regulated promotion up to the rank of field officer, was excessive, and lacking in uniformity. Political disaffection existed in regiments drawn from certain districts. The staff was highly educated; but much of its value was wasted in the inspiration of incompetent generals. The Austrian cavalry ranked with the most perfect of Europe; but for want of leaders its chief use has generally been to cover the retreat of defeated infantry. Mobilization, from indifferent means of communication; the delay of depots where arms, clothing, etc., are distributed; the scarcity of railroads to facilitate rapid movements of men and material, was necessarily slow.

On the other hand, Prussia with scarcely over one-half the population of Austria (Prus. 22,000,000, Austria 37,000,000) could muster 720,000 trained men. Its provisions for mobilization were perfect. It had the only army in Europe in which the infantry was armed with breech-loaders; and these had been tested in the Danish War. Its artillery was also provided with breech-loading field-guns. It is unnecessary to describe the efficiency of its general staff, which has won the respect and admiration of all true soldiers. Its railway organization was marvellous, enabling it to transport 197,000 men, 55,000 horses and 5300 wagons distances from 120 to 300 miles, without any failure, in 21 days, "so that they attained the required spots at the very hour required."

The result was the Six Weeks War, and, in spite of suc-

cesses in Italy, the complete humiliation of Austria, together with the loss of power among the German States, and of considerable territory.

In 1870, France forced war upon Prussia, which involved the newly formed North German Confederation. Prussia had increased her army, since 1867, and her superb military system now pervaded the whole confederation. Her officers and men contained the best blood of the nation, were superbly trained and disciplined, and were animated with military spirit as well as patriotism.

In France, the best educated and higher classes did not serve in the army. The ranks though filled by conscription, contained many substitutes. The military spirit of the country was low, as is shown by the candidates for St. Cyr having fallen off from 2000 in the early years to about 600 in the last years of the Empire. Effeminacy was widespread, as was proven by the great quantities of costly provisions and baggage captured by the Germans. Military duties had been neglected in peace, and officers "loafed about immensely." The troops had, in late years, received little or no occupation, and discipline was low. One writer reports that a single infantry regiment, when only several miles from the enemy on a hot day, threw away 800 knapsacks and 700 rifles, and that the men lying in ditches, showered insults on their officers who sought to encourage them to go on.

The numerical strength of the two nations was as follows:—

The field army,	Germans,	518,000 men, and 1506 guns.
	French,	285,000 men, and 984 guns.
Depot troops,	Germans,	161,000—French 91,000.
Garrison army,	Germans,	187,000—French—none.

The French troops were armed with the Chassepôt rifle, a much superior weapon to the needle-gun carried by the Germans. As the invasion of German territory was contemplated, ammunition and food supplies were placed as near as possible to the frontier, in fortresses that were incomplete and not fully armed. The railway system was poorly organized and managed.

The Germans, on the other hand, were prepared at all points. Besides being in readiness for offensive movements, their defenses had not been neglected. Their systems for concentration,

of supply, and of railway management were practically perfect. France had intended and expected to invade Germany, but the Germans were ready before the French—and the tables were turned. The French navy, which might have created a diversion on the north coast, and in the Baltic, was as unready as the army. The result was that in twenty days after war was declared, the Germans entered France, and in six months, after the capture of the emperor and two great armies, Paris was in their possession. France lost considerable territory, and paid a tribute which, together with the cost proper of the war, makes her debt one of the largest per capita in the world. In addition the defeat precipitated a revolution in the French form of government which success might have postponed or possibly prevented.

Perhaps the best object lesson afforded by other nations, bearing on the subject under consideration, is that of the late war between China and Japan.

The Chinese resting behind their mighty wall, with a policy of non-intercourse, and relying on the fancied strength of immense numbers, have, during the last century or two, made as little progress in war, as in other matters. Even the descendants of the warlike Manchus, who, two hundred years ago, overthrew the Chinese proper, influenced by their surroundings, had entirely lost their military spirit. Although her wall could not prevent rebellions, nor non-intercourse prevent the giving of offense to outside nations which resulted in loss of treasure, lives, and territory, she complacently surveyed her millions and smiled blandly. In 1894, with a population of 400 millions, she had a nominal army of 800,000. This vast number of men was in fact but a constabulary—and a poor one it would seem, since insurrections which might have been put down by a company of trained soldiers were permitted to spread until towns, cities and provinces were overthrown and devastated.

Some efforts at reform had been attempted by the great statesman, Li Hung Chang, and it was estimated that 70,000 men in the province of Manchuria had been armed in the European fashion; but even these low figures are considered as indicating the "intention and not the results of reform." As an indication of the actual condition of military progress, it is stated

that during the war a governor of one of the provinces reported upon the efficiency of his soldiers in the use of the bow and arrow. The mass of the Chinese regard the military profession with contempt; and General Upton, writing about twenty years ago, tells us that China was the only country in which the profession of arms was not honored. It is a proverb in China, he tells us, that "as you would not use good iron to make a nail, so you would not use a good man to make a soldier." A very low order of intelligence and acquirement was demanded of military officers—principally skill and expertness in archery, and sword practice, and ability to lift and swing heavy weights.

China had some modern war vessels; but, although assisted by foreign officers, her naval skill was much inferior to that of the Japanese.

Japan has a population less than one-tenth that of China. Her interest in the outside world is quite recent. As a step in advance, she had in the Middle ages adopted the Chinese military system; and like China, she has until very lately discouraged intercourse with other nations. Her military reforms date from 1867; and General Upton says her government "founded on sand in 1868," was "settling on rock" in 1878. In 1872, she adopted with great energy and careful attention the system originating in Prussia and, in the main, accepted by the Continental nations of Europe. Since 1889, every Japanese subject becomes liable to military service at the age of 20 years—the service covering 3 years in the active army, 4 years in the reserve and 5 years in the territorial army. Besides, every male between the ages of 17 and 40 is considered part of the national army. Since with all the exemptions regarded as necessary and proper for the general welfare of the state, rejections for physical causes, etc., a greater number remains than is called for by the requirements of the state, the necessary contingent for actual service is selected by lot. The war schools for instruction of officers are said to be excellent, and the peace army of over 60,000 is well trained, disciplined and armed.

The war, both at sea and on land, was one-sided from start to finish—always in favor of the Japanese.

China has been humiliated by a country greatly her inferior in population and wealth. Besides control over Corea, she loses

Formosa and the Pescadores, which must ultimately add to Japanese strength, resources and influence. She, in addition, pays 200,000,000 taels ($150,000,000) indemnity to Japan, with which the latter is now arranging to increase her navy, add to her army, and make other important extensions of her war preparations.

Our own experiences as a nation, point to the value of war preparations.

In 1812, few of the soldiers of the Revolution, fit to bear arms, remained. On the declaration of war, the actual force under arms was about 10,000 men, of whom one-half were raw recruits. The organization of the War Department was so deplorably wretched, that Mr. Troup of Georgia in a speech in Congress (April, 1812), declared that it was "impossible either to begin the war or to conduct it." It is true that provisions were made, early in 1812, to increase the Regular Army to 38,000 men, and for enlisting volunteers—some in one-year regiments and others to serve "during the war"—which would have increased the number to 58,000 men. The main reliance, however, was upon the militia of the States, which is described (much as our National Guard is to-day) as "quite well organized, and armed, and accustomed by frequent drills and parades to military manœuvres."

It is noteworthy that our seaboard defenses were well planned and constructed, and were, for that period, truly formidable. Our navy was small but respectable, and our sailors were the best in the world.

The result was that war raged for two years and a half. On land it was a history of inability to fill the armies to proper strength, and of disasters in battle—until near its close, when incompetent and inexperienced leaders had given place to competent ones, and the raw levies had been transformed into soldiers. It should not pass unnoticed that Dearborn, the first Major General, was collector of the port of Boston when appointed. Although he and most of the other new generals and chiefs of bureau had seen service in the Revolution, they "had been civilians for more than thirty years and were indebted for their appointments rather to political than to military considerations." Neither should it be overlooked, that most of the im-

provised soldiers who did their duty well at Chippewa, Bridgewater and New Orleans were frontiersmen skilled in the use of the rifle, and who knew something of border warfare.

During the whole war, however, our coast defenses were nowhere found vulnerable; and, in the numerous naval engagements, our vessels gained almost a continuous series of victories.

It is worthy of remark, in connection with observations already made that Mr. Thomas Jefferson and his political adherents, who, contrary to the views of Washington and the Federalists, had strenuously opposed military and naval expenditures as a means of securing neutrality, peace and prosperity, were the principal agents in precipitating the second war with England.

The Mexican War found our little Regular Army in a high state of efficiency. Its officers were the peers of any in the world, in the knowledge of their profession; and the men were in excellent training and discipline. The staff administration was abreast with that of any army in Europe. When we consider that the telegraph and railroad had not yet come into general use, the results accomplished in matters of transport and supply seem wonderful. Our Regulars were assisted by volunteers, and the State militia was not called upon. Mr. Marcy, the Secretary of War, had served in the War of 1812, and knew of the failings of the militia troops and system in that war. In 1847, the volunteers in the field numbered 22,000, and the Regulars 21,500; in 1848, the numbers were 21,600 volunteers and 22,600 Regulars.

The Mexicans were but poorly commanded, disciplined and instructed. Although they were by no means despicable in numbers, resources and personal courage, yet they were hardly to be compared with the poorest soldiers of Europe.

Notwithstanding much time lost by lack of knowledge of topography, etc., Mexico was completely conquered, and surrendered to us valuable territory. It is probable that had Mexico been fairly prepared, this war would either not have occurred, or, at all events, would not have resulted so greatly to her disadvantage. Certainly we could not have conquered her with so small a force.

In December, 1860, the Regular Army numbered 1108 officers

and 15,250 men, and aside from the disaffection existing among its officers, was powerless to suppress insurrection, by reason of the well planned scattering of the organizations, under the orders of a treason-plotting Secretary of War. The old militia system, founded on a law which remains in our present Revised Statutes, had been virtually abandoned. A few military organizations were maintained by the States. General Cox, speaking of the situation in Ohio, says: "A long period of profound peace had made every military organization seem farcical," and, he adds, "the State militia was only a nominal thing." The military spirit had been better preserved at the South, than in the North—and, of the few independent organizations, as a rule the "crack" ones belonged to the Southern States. General Cox (who was a brigadier general in April, 1861, and who afterwards became a distinguished major general) tells us that, when Sumter was fired upon, he was a member of the Ohio Senate, and held a commission of brigadier general in the State militia. He had never worn a uniform. He had studied "such books of tactics and strategy as were within easy reach," and had "read military history with critical care." He adds, "I had therefore some notion of the work before me, and could approach its problems with less loss of time than if I had been wholly ignorant."

The 75,000 militia first called out were hardly mustered in before their term of service (three months) expired. Half a million of volunteers were then called for, and in response more men offered their services than could be accepted; but it was not until the close of 1861 that the infantry in the Army of the Potomac were armed, and the artillery were not armed until still later. General McClellan in his "Own Story" particularly complains of the difficulty he experienced on account of the absence of staff officers skilled in the duties of organization and administration.

The happenings of the four years of this most gigantic civil war need not be recalled. While we justly pride ourselves on the magnificent soldiers produced in the school of actual war, we should not be blind to the fact that the country paid very dearly, if not too dearly, for the instruction of these soldiers. We may well ask, whether, if our Regular Army had been larger —(since no disaffection existed among its enlisted men), the

Government would have been so completely paralyzed as it was in 1861? Might not the Rebellion have been crushed in its beginning? The grand armies that sprang from peaceful homes, in four years, saved the Union; but at what a great cost! General Vincent, writing in 1881, placed the public debt, arising out of the Rebellion and money paid to pensioners, as $3,148,447,638.49, "which would support our present military establishment (costing say $30,000,000 yearly) for 105 years." In 1881, we paid $50,000,000 for pensions and the pension disbursements have since then regularly increased, so that in 1895 we paid nearly $141,000,000. From the standpoint of those who love peace and shudder at bloodshed, would it not have been better to have been able by the use of a stronger national force to have crushed out the insurrection before it became a rebellion? From the standpoint of the most patriotic—even admitting that great benefits have been gained by the raising of immense armies; by the intermingling of our people; by the development of new energies; by the rousing of the youth of the country to adventure, endurance and heroism—would it not have been much better had our armies been able to end the war in less time than it actually took, and with less loss of treasure and of lives?

Captain F. V. Greene, whose opinion is certainly entitled to great weight, tells us that "the extraordinary duration of the war may be traced directly to the lack of preparation and organization."

A later incident in our history, of itself, should be convincing as to the advantage of being in readiness for war. It is that of the attempt of certain European powers to establish an empire in Mexico, and to place the Austrian prince Maximilian on the throne. The protest of our Government, made at a time when the United States needed no jingo newspaper to assert its military power, when, both north and south, the country was filled with such veterans as Europe did not, and could not possess, served not only to preserve the liberties of a sister republic, but undoubtedly saved us from being involved in a momentous foreign war.

In the United States there has always existed more or less jealousy of a national army in time of peace. The danger to our liberties from a military despotism is carefully guarded

against by the Constitution. In 1816, Mr. Harrison saw danger in the "knowledge of the military art being confined to a part of the people, for sooner or later," he says, "that part will govern." He had reference here not even to the Regular Army, but merely to organized militia, which did not show itself to be a very formidable body in 1812. General Sherman tells an interesting story of the attack made upon West Point graduates at a political meeting at Hamilton, Ohio, in 1840, and believed that the existence of the Military Academy was at that time in real danger.

The opposition of late years to any increase of the Regular Army, even to give it bare efficiency, is well known. In spite of the recommendations and urgings of all our generals, and many of our wisest and most conservative statesmen, the army remains practically as it was after the reduction and consolidation of 1870. The principal ostensible objections to the increase of the army, is on the ground of its uselessness, or the dread of increase of national expenditures; but there is in addition considerable opposition to the army, on the part of peace societies, and by those who look upon all soldiers as idle, useless and even vicious members of the community, who are always seeking to plunge the country into a war. A bill to increase the army to 50,000 men, introduced in Congress some years ago when the Indians were troublesome in Arizona and New Mexico, was bitterly opposed as a measure looking toward military despotism. Nor has better success attended an effort made to create an Active Militia, to take the place of the militia force provided for by an act of 1792, which is so ridiculously antiquated that it seems to remain on our Statute books, merely to refute the statements of those who say we have no ancient history.

We rest too upon national self-conceit, claiming for ourselves special qualities of excellence as soldiers, forgetting that almost every other great nation has equal claims founded upon history and fact, and forgetting too, that we are no longer a nation of war-schooled veterans.

Readiness for war means the possession of a sufficient and efficient force, that can be made immediately available, and the means of supplying it with everything needful to enable it to fight effectively, not only defensively but also offensively.

Our resources are very great—indeed more than sufficient. We have plenty of men, in whose courage, physical endurance, and (in spite of the presence of a large foreign element) patriotism, we can confidently rely. We have abundant wealth, and can produce everything needed in war. At the close of the Civil War, over 1,000,000 men were actually under arms, and over twice that number were still liable to conscription. Since then our population has more than doubled. It must be remembered, however, that untrained and undisciplined men are not soldiers, and that to make such men soldiers takes time. Food, clothing and medical supplies need give us little concern; but raw material in the shape of iron, steel, etc., cannot be converted into modern small-arms and ordnance, neither can ammunition be manufactured without special plants, nor can fortifications and war vessels be quickly constructed.

Our only standing army is a force which contains one man for every 2500 (one-twenty-fifth of one per cent.) inhabitants—the smallest peace force of any of the great nations, and even less than that of Mexico. It is scattered so greatly that it is a notable event whenever 1000 men are assembled together, and many of our citizens residing in well populated districts have never seen a body of regular troops. But few of its officers have participated in any more extended movements than those of the school of the regiment. What is known abroad as "staff knowledge" receives too little attention. They will, however, as a body, compare in zeal and intelligence and in general professional attainments with those of any other nation. The enlisted men of the Regular Army have always and under all circumstances performed their duty in a manner reflecting credit on themselves as well as on the nation. No better soldiers can be found anywhere else in the world.

There are many unanswerable reasons why the United States should not have a large standing army. A sufficient one is that it is not needed.

No doubt can exist, however, that the army should be large enough to fulfill its purpose, both in peace and in war. It should therefore be large enough to make it possible for a force to be promptly assembled at any point where it might be needed to prevent, or, if need be, suppress insurrection or other illegal

acts calling for its employment by the general government. It should moreover be so large that it could afford the country security from the attack of a foreign enemy, by holding him in check until the military reserve of the nation—which, until war threatens, may, like the mass of the people, devote itself to peaceful pursuits—could be mobilized. To use an expression, understood by many, the standing army should be large enough to perform properly the "outpost duty" of the nation, while the navy scouts and patrols the seas.

To secure the efficiency of the Regular Army, the most careful training, discipline and organization are necessary.

It is the school in which the professional soldier in time of peace should receive experience and education to fit him for organizing and leading the volunteers called into service in event of war. Consequently every facility should be afforded to render that experience and education of the highest order. The handling of large bodies of troops involves many problems, the solution of which cannot be learned except in the school of practice. The army should therefore be large enough to render possible not only brigade and division drills, but also exercises in assembling, transporting and manœuvring brigades, divisions and even army corps. While the bulk of the troops for such practice could and should be furnished from the reserves, the regular force should be present in sufficient strength for the formation of model brigades and divisions.

It is not the object of this paper to propose any scheme of organization for either the staff or the line. Readiness for war, however, demands that the minimum strength of the Regular Army should admit of an efficient organization.

This will embrace such a trained staff of administration, supply and construction, together with a medical corps, as may be able to meet all possible needs. The administration and supply departments need not, in time of peace, be large. Indeed, great advantage would undoubtedly result from the detail of line officers on staff duty. Such details would give valuable experience to officers who are to command troops, while the permanent staff positions should be filled by line officers who upon trial exhibit special fitness for staff service. The medical corps need not be maintained at greater strength than is necessary to

administer to the actual needs of the troops. The specialists of construction (engineer and ordnance corps) require special fitness and training, and therefore ought to be maintained at a strength greater than the peace demands upon them; but, as the case with our engineer corps at present, they can always be fully employed so as to be of great benefit to the nation.

Our sea-coast fortifications and their armaments must be cared for by heavy artillery troops, and officers and men practiced in the use of modern heavy ordnance.

Field artillery and cavalry, the horses and men of which cannot be quickly trained, and which cannot be maintained except in small numbers and at considerable cost and inconvenience by citizen soldiery, should be kept at such minimum strength that, with those which could be obtained from volunteer organizations, would immediately provide an army of say 100,000 men with a due proportion of these arms.

The infantry, by whom most of the fighting must be done, who always compose the bulk of armies, and who, moreover, are specially useful as a safeguard against domestic violence, should not be neglected, as it is apt to be, on the ground that all a foot soldier need know is how to handle and fire a rifle and to march correctly in the ranks. To make a good infantryman requires nearly as much time as to make a good artilleryman or cavalryman. Our veteran volunteer infantrymen of the Civil War were quite as good as the Regulars; but it must not be forgotten that these men had become regular soldiers in fact, if not in name. It is not detracting in the least from the merits due to those we call "citizen soldiers" to say that, until they acquire the "habits" (to use General Sherman's word) of the regular soldiers, which come only after civil pursuits have been thrown entirely aside, and become for the time professional soldiers, the country can never rely fully on their steadiness. We need, therefore, a regular infantry force that can be collected in sufficient numbers to constitute a force for volunteers to rally upon and ready for immediate and effective field operations. It is true that a smaller force might be expanded very quickly by means of volunteer recruits, some of whom might know something of drill and the use of the rifle; but the veterans of the Civil War can no longer be taken into calculation, and experience

has proven that, when volunteers are called for, they prefer to enter new organizations rather than the regular regiments. During the Civil War, the regular regiments were as a rule mere skeleton organizations. Ex-regular soldiers, fit for duty, would probably be sought for as instructors and officers of volunteers.

That the Regular infantry will soon be increased seems improbable, but there is little doubt that its present strength should be doubled; and there can be none that it be so reorganized as to permit of more rapid expansion.

A regular army large enough to meet the requirements as to national security from the dangers of insurrection and invasion would, in all probability, be sufficiently large to admit of a desirable organization.

Military men who have carefully investigated the subject are of opinion that several of the European powers, in spite of the intervening ocean and our present naval force, could, in a few days, land on our shores from 75,000 to 100,000 trained men, with all necessary supplies, at a point chosen by themselves. A leading British journal discusses the probability of a war with the United States in the near future, and claims that Great Britain would be able to land 100,000 men in our territory, besides sending 20,000 more to assist the Canadians. In 1890 the Adjutant General of the United States Army estimated that England could land on our shores 60,000 men in twenty-five or thirty days.

To be prepared for such a contingency, we should be able to collect a force equal, at least, to that of the invader at any threatened point, and therefore should have, at the least estimate, 200,000 trained men that could be placed in the field on a few days' notice.

In 1896, the Adjutant General estimated the number of men available for military duty (unorganized militia) to be over 10,000,000. This unorganized militia includes all able-bodied male citizens between the ages of eighteen and forty-five years of age. They bear the same relation to soldiers that pig-iron does to steel.

The organized militia numbers at present about 113,000, and are nothing more nor less than State troops, although all but twelve States out of the whole number designate these troops as

"National Guard." As under the Constitution no State can keep troops in time of peace without the consent of Congress; and as Congress makes yearly a small appropriation for arming and equipping the organized militia, which is paid to the States and expended on these organizations, it must be presumed that they exist by the tacit consent or authority of Congress. Whether or not they exist constitutionally, no doubt can arise that they exist only as State troops, although in most of the States some provision is made for their being called into the service of the United States.

Too much cannot be said in praise of the military spirit which pervades these troops. Some of the regiments are well equipped, officered and disciplined; and have attained a proficiency in drill, target practice and such matters, not excelled in the Regular Army. Only a very small proportion, however, has attained high excellence, as will be apparent from an examination of the very liberal reports of the inspecting officers, and of the data collected by the Bureau of Military Information. Granting all that is claimed for these troops, they have still to acquire the "habits" which General Sherman recognized in the regular soldier.

Habits of strict and prompt obedience to orders, and knowledge of how to "shift for one's self" when necessary, etc., are more essential in the soldier than skill at target practice. "A mob of sharpshooters can never hope to withstand a smaller well disciplined body of moderate skill with the rifle."

Moreover, as has been pointed out, the organized militia, or "National Guard" is not in fact a national force. The President could make requisition upon the Governors of States for troops, and not one of the organized bodies, as such, would necessarily be furnished in response. Even allowing that all should respond they could not as militia under the Constitution be used for any purpose except to "execute the laws, suppress insurrection, or repel invasion." The President could not legally order them beyond the limits of our territory for any other purpose—no matter how important to the public welfare. We may never again have an experience like that during the War of 1812, when the Governor of Massachusetts, sustained by the State Supreme Court, claimed that he, and not the President of the United

States, was to be the judge of the exigency upon which the militia was to be called into service. The United States Supreme Court, in Martin *vs.* Mott, unanimously overruled this view of the State Court; but there is no power to compel a State to honor the call of the President for militia. The United States must take the matter into its own hands. The "National Guard" organizations would probably, in any great national danger or need, offer their services voluntarily. It is well, however, to consider that it rests with them to so volunteer.

The militia of the Constitution is a theory of the past. It failed of its purpose on all occasions, and now the name is objectionable to the State troops. The National Guard is an effort of the military spirit among our citizens to supply an efficient substitute. It remains to be seen whether the jealousy of the States of what is termed "Federal Centralization" shall continue as in the past to endanger the welfare of the nation.

We will probably, in future great wars, rely for our armies on enlisted volunteers, stimulated if need be by bounties, and, this means failing, resort to conscription, as in the Civil War. We will probably never want for men. If we had a less number our people might have a less amount of dangerous self-confidence. They might then give more attention to the warnings so often given, and so often unheeded, that since the veterans of the Civil War are no longer available, we have too few soldiers.

One of the evils of relying upon volunteers is that the burden of war, its hardships and sufferings, are almost entirely borne by those who love their country more than themselves; while the unpatriotic and those who have the largest holdings of property and wealth, stay at home, and expend their patriotism in encouraging others to enlist, and in growing rich on Government contracts, etc.

In the first year and a half of the Civil War, more men offered as volunteers than were required, but later sufficient volunteer recruits could not be obtained by requisitions upon the States. Then Congress, under its constitutional power to raise and support armies, passed the Enrollment Act of March 3, 1863.

The general government, for the first time in its history, ap-

pealed directly to the people in calling for volunteers to create large armies, established its own recruiting system independent of the States, and at the same time resorted to conscription. The country was from this time divided into districts, and the quota of recruits required from each was made known. If this quota was not furnished by voluntary enlistments, the deficiency was supplied by conscription.

By an Act of February 24, 1864, the President was authorized to call for such number of men for military service as the public exigencies might require. This established a precedent, which, as General Vincent remarks, "conferred a delicate and mighty power," but which will undoubtedly be followed in case of future national necessity.

Great embarrassments in recruiting our armies arose from the States insisting, even up to the close of the war, upon furnishing new regiments instead of replenishing those already in the field. This enabled the Governors, under what they claimed to be their constitutional right, to appoint numerous commissioned officers who were often useless, furnished organizations with an undue preponderance of inexperienced recruits, and left the seasoned regiments with skeleton companies.

The navy of the United States is at present sufficiently formidable to make it respected. Its vessels rank among the best in the world. Yet it is much inferior in size to those of several of the European nations; and, as it is necessarily much scattered, it would be almost impossible for it in its present state to afford the country complete protection from invasion. It should not be forgotten, too, that we have a vast stretch of sea coast on each of the two great oceans, and that the distance across the Atlantic is much less than from New York to San Francisco via Cape Horn. Indeed, a European fleet could reach San Francisco almost as soon as our own vessels could from New York Harbor. Herein, it may be observed, lies the importance to us of an Isthmian route. Our means for building vessels of all kinds are now ample for all possible naval contingencies. Our naval ordnance plant is equal in every respect to any in the world, and we can make the highest grades of smokeless powders. The Secretary of the Navy, in his last report, states that, in his opinion, we have already a sufficient number of cruisers

and gunboats, and that the construction of battle-ships and torpedo boats will supply our needs. The professional zeal and acquirements of the officers of the navy is of the highest order, and our naval manœuvres and the Naval War College afford them the means of being ready for any demand upon their knowledge and skill. Better docking facilities appear to be greatly needed, and it is almost certain that, in case of foreign war, serious embarrassment will arise from our not possessing defended coaling stations and harbors of refuge.

We have a small naval militia reserve in fifteen States—about 3000 men, intended to contribute to coast defense in case of need—thus affording opportunity for the regular navy to operate offensively.

Our coast defenses have for many years been sadly neglected. An act passed March 3, 1885, made the first provisions for establishing a system of modern fortifications, devised by what is now known as the Endicott Board, and which involves the construction of "about 100 distinct batteries, grouped in twenty or more harbors." Thus far about $26,500,000 have been expended —about $12,000,000 for sites and the constructions thereon, and the balance for armament. The work is but begun, and at the present rate of progress the day is distant when all of our important harbors will be protected. Only about one-fifth of the work contemplated has, it is understood, been completed. It must be borne in mind that, before any progress could be made, large and expensive plants for manufacturing heavy ordnance, carriages, etc.—such as were not to be found in this country ten years ago—had to be provided. There appears, however, no good reason for continuing our dangerously dilatory policy in regard to providing adequate, and properly manned, coast defenses.

With strong and sufficient fortifications and an efficient navy we would be practically secure from the danger of sudden invasion or the visits of hostile fleets for the purpose of plunder; but at present our only protection is the navy, which can have in consequence little opportunity for aggressive action.

In connection with this somewhat dreary and discouraging inquiry into our state of readiness for war, there is one gleam of hopeful light.

This arises from the well-developed and growing interest in

the dissemination of military knowledge in the schools and colleges throughout the country. No better work can be accomplished by the numerous patriotic societies than to foster the patriotic and military spirit of our youth. Little fear need be entertained that the acquisition of military skill and knowledge makes men quarrelsome. The opposite result is probable since it is undoubtedly true that strong, healthy, sensible men are less apt to be ill-natured and quarrelsome than puny, ill-balanced weaklings. Not the least doubt can exist that military exercises are most excellent for physical development; nor that military discipline and exactness develop qualities in young men of the utmost usefulness in civil pursuits. Military habits are easily acquired by young men; and once acquired are never entirely lost.

At present forty-two schools and colleges are receiving instruction from Regular Army officers, at which 1376 students attend artillery drill, and 9760 are drilled as infantry. Improvement doubtless can be made in rendering this instruction more general. It should be a feature in all the public schools of the land, and be fostered by the general government.

What might be its development may be imagined when we are told that in 1882, there were 282,000 boys receiving military training in the Swiss schools. While copying other nations—not always it is to be feared with wisdom or benefit—we might learn much from the little but sturdy and long existing Republic of Switzerland, which with an area one fifth that of the State of Minnesota, a population of less than 3,000,000, and a constitutional provision denying the Federal Government the right to maintain a standing army, has nevertheless, including the landsturm, a well-trained military force of 486,682 men. Within a week of the order being issued for mobilization, 200,000 troops, ready for active service in every particular can be concentrated in any part of Switzerland. Though the annual cost per man ($35) is the lowest of all European armies, it is claimed that the Swiss soldier is "better armed, drilled and prepared for the emergencies of warfare than that of any other nation." This wonderful result is accomplished by the cantons being required to provide not only gymnastic instruction, but also military drill for all boys from the age of ten until they leave the primary

schools. From the time of leaving these schools until their twentieth year, this instruction is continued and may include rifle practice in the last two years.

Distinct from the compulsory gymnastic classes has sprung up among the youth the Cadet Corps, made up of the boys from 10 years old and upwards, organized into companies, battalions and batteries, officered by themselves and their instructors. Sometimes these organizations, beside the regular practical and theoretical exercises, take part in the grand manœuvres under the high military officers of the confederation.

It is frequently asserted that we have little cause to become involved in foreign war. We are apt to view the broad oceans that separate us from Europe and Asia as interposing a huge buffer to prevent us from jostling or being jostled by other nations. We have no interest in preserving the balance of power in Europe. We care little whether Russia or England controls India. We look upon the affairs of England with the Boers, or in the Soudan; of Italy with the Abyssinians; of Japan with China; of the far-off American states, much as an audience does upon a play in a theatre. We may take quite a deep interest in the play, may even become interested in the actors, but we never dream of acting ourselves. We forget that all the world's a stage and that all States as well as all men and women are players thereon.

As a matter of fact, the increasing rapidity of ocean travel has made us almost neighbors with all of the leading European nations. We have commercial relations with almost every country on the globe, and our commercial intercourse must be enlarged if we are to maintain our place among the nations. We cannot afford to lose our assertiveness, nor allow other countries to thrust us aside, or dispossess us of our rightful share of the trade of the world.

We should not imagine, because the Dominion of Canada on the north and the Republic of Mexico on the south have neither apparent inclination nor ability to encroach upon our territory and because our people do not covet the territory of our neighbors, that we shall continue our present friendly relations. To-day we view the agitations about the annexation of Canada to the United States as chimerical and absurd; but agitations of

this nature are apt to create irritation. We have recollections of the Fenian movement and the fishery disputes. We still have the Behring Sea difficulties, and the Alaska boundary dispute to arrange. We are destined soon to find a rival in England for transcontinental and Asiatic traffic. We may close our eyes to the situation, congratulate ourselves on a treaty of arbitration, and imagine an Anglo-American alliance. Before we are lulled to peaceful sleep, we should reflect that England has Halifax and Bermuda strongly fortified, and is prepared in event of a possible rupture of our peaceful relations with Canada, to look after her interests. Nor has she neglected, as we have done, her Puget Sound defenses, and she could give us no little trouble on the Pacific Coast. It is not to be presumed that the network of ocean cables connecting England with Halifax, Halifax with Bermuda, and which will probably soon connect Bermuda with the Bahamas and the West Indies, are intended solely for commercial use, or that they will be courteously turned over to us in case of failure of arbitration of any point in dispute. It is well, too, to bear in mind that England practically controls all our cable communications with Europe, a fact which we may some day find of vast moment.

England never hesitates, as we profess to do, to help herself to so much of the earth as she can grasp and hold. A study of our own past boundary difficulties with her, even if we took no interest in other affairs, should be sufficiently convincing in that regard. Volumes might be written to show how closely and cleverly she has clipped the ragged edges along our whole northern border. We may not covet Canada; but does not England covet some of our seaports on the coast of Maine? Granted that every Englishman prays the Lord to incline his heart to keep the tenth commandment, is it at all certain that England would not be glad to have an opportunity to treat us as Japan has China? We may find out when it is too late that neglect of war preparations means, sooner or later, national disaster. Leading British journals do not hesitate to publish their knowledge of our state of unpreparedness; and intelligent Englishmen smile grimly at the insane ravings of what is termed the jingo element in this country.

With our sister American republics, it would seem we should

forever be at peace; but were we not on the brink of war with Chile, not many years ago? Granting that we, flattering ourselves on our greatly superior latent strength, may be willing to be magnanimous and conciliatory, can we always afford to yield to what may be unreasonable demands, or be meekly forgiving to unwarranted insults? May we not, in our present situation, be forced to resort to war on some occasion, when if we possessed available military strength, we might not be subjected to provocation?

Our greatest danger from foreign war, seems, however, to be of a different nature. It is our manifest destiny to seek to extend and increase our commerce. If non-intercourse does not serve to avert foreign complications, it must nevertheless be conceded that they arise most frequently among peoples who compete with each other in the struggle after wealth. Soon or late our interests will probably conflict with those of other leading nations, and it may unexpectedly happen that arbitration and peaceable interventions may fail to preserve peace. It must not be thought that because we deem it just and proper, for example, to exclude Chinese emigrants, we are making China more friendly. Nor must we imagine that we may see fit to exclude cheap foreign goods without creating unfriendly feeling. Neither can we gain any advantage over other nations by the use of an interoceanic canal without arousing jealousies that may easily find a pretext to render us uncomfortable.

Again, we have many, who from motives of humanity, religious sympathy, or desire to foster the spirit of universal political liberty—or some such cause—consider it the duty of the "greatest republic under the sun," to interfere in the affairs of other nations.

Frequently men and women of intellect, and of high reputation, combine to foster public sentiment that is intended to bring about Governmental interference. Our press rejoices in being unbridled, and our people are always ready to assemble for listening to orators who revel in freedom of speech. It matters little that these newspaper writers and public speakers are very apt to oppose standing armies, wars, and even military instruction; they very often succeed in raising a breeze of foreign indignation and may some day arouse a storm of war. We can-

not meddle in other people's affairs without getting involved. If we must meddle, even from a sense of duty—and doubtless there will be occasions when we will be persuaded that such is our duty—we should be prepared to do so successfully, and not, from lack of preparation, subject ourselves to punishment for our temerity.

We must not forget that south of us lie Central and South America and numerous islands, including those of the West Indies. Nearly all of this vast territory is occupied by independent republics; but there are besides a number of European colonies. The British empire has colonies in Honduras, Guiana, the Bahamas, Jamaica, Trinidad, Tabago and a number of smaller islands of the Lesser Antilles. Spain owns Cuba and Porto Rico. France, besides French Guiana, possesses Guadeloupe, Martinique and five smaller islands in the Lesser Antilles. The Netherlands have colonies in Dutch Guiana, Curacoa, Oruba and own four other of the Lesser Antilles.

These southern lands cover an area more than double the whole of Europe. In Europe there is an average of about 107 persons to the square mile, whereas in the regions south of the United States the average is 5.7 persons to the square mile.

These regions hold in reserve the most valuable forests and mineral deposits on the earth. The agricultural resources are marvellous. At no distant day, as must be apparent to all thoughtful men, the invasion of the overflowing population of Europe (and perhaps of Asia) which we term immigration will surely seek these favored, yet thinly settled districts. Our own and foreign capital will be invested in railroads, mines, etc. Soon or late disputes will arise, and claims of vested rights and interests may be made, which will lead to international troubles. We should, if wise, prepare for such a contingency. We have an interest in fair dealing, and preserving republican institutions on American soil. More than all, we owe to ourselves, to take measures for our own welfare. If we are to maintain our place among the nations, we must enlarge and extend our intercourse with Central and South America. In doing so we are likely to come in conflict with other nations, and should be so prepared as, if possible, to avoid war, or if compelled to take up arms to do so promptly and effectively.

The founders of our republic saw the necessity for guarding against insurrection and domestic violence, and it should be remembered that the first call for the national military power was to suppress the Whiskey Insurrection. We need not here dwell upon what has been pointed out by Professor Guyot as a probable result of the physical characteristics of America. Eminent sociologists agree with him that our country is destined to be the scene of social developments, and, consequently, of social conflicts. We have already had experience with struggles between labor and capital, as well as between the Mongolian and the white laborer, and between the white and black races. We have among us not only many who are not in the least patriotic; but also the most turbulent anarchistic element in the world. This country of ours is the asylum not only for political refugees, but also for outcasts of all sorts—and this in spite of recent improvements in our immigration rules and laws. In short, we are liable at any moment to have some social agitation arise, which, if unchecked, may become dangerous to the national welfare, or interfere with the proper enforcement of national laws. The mere presence of a strong military force—part of and composed of the law abiding people—that could be called into instant service would be most salutary in checking and restraining such agitations, and preventing them reaching a dangerous stage.

It cannot be disputed that we are unprepared for war. General Kautz considered us as in a measure as improvident as China. He has pointed out that such military information as has grown up among our people has taken root by reason of the "natural affinity of the soil," and not in consequence of government aid or encouragement. The Military Academy was originally designed for the purpose of diffusing military knowledge among the whole people, and at the time of its foundation was considered equal to that task. Now it does not supply all of the officers required for our little regular army. General Kautz reminds us that during the Rebellion many lives were sacrificed to ignorance and inexperience among officers, and expresses a fear that "we shall be as unprepared for the next war as we were for the Rebellion." No one who has studied the conditions will question his assertion that "A first class power that appreciated our lack of preparation, would be able to conquer its de-

mands before we learned enough to utilize our resources."

Such warnings as these are accepted by many as an effort to render important the military service, and are consequently slighted and ignored. Perhaps then it would be well to heed the warning of a writer in the *Broad Arrow*, published in London some months ago. He says "If the United States remains united there will ultimately be war between the British Empire and that nation." He asserts that the British army and navy would not only be first in the field, but the general position of the two powers would be "strikingly analogous to that of China and Japan." "England is ready and the United States are in no way ready." Any one who desires to know more in regard to England's doings, in which we are concerned, will find much of interest in an article by Captain Cotton, 1st Artillery, in the JOURNAL OF THE MILITARY SERVICE INSTITUTION for November, 1896.

While trusting to the promptness with which our citizens will rush to arms should danger threaten the nation, it ought not to be overlooked that wars of this age are likely to be sprung without formal declarations. We cannot, as General Miles warns us, continue to hold the theory that we can in a short time prepare for war.

The aim of this paper has been to make clear—what many dispute—that the United States should be prepared for war; to emphasize, if possible, our deplorable lack of such preparation.

Many plans have been suggested for increasing and reorganizing the army, the creation of a national reserve, etc., and the War Department is now endeavoring to secure a reorganization of the militia. Any plan for a national military force should provide for universal liability to service within certain limits of age, etc. It should also secure such organization, discipline and training as would enable us to successfully cope with the best and largest armies that can be opposed to us. The Regular Army should, if possible, be popularized, and to that end every effort should be made to bring it in contact with and keep it on good terms with citizens, and especially with the citizen soldiers. It would then serve not only as a model in matters of service, discipline, etc., but be looked upon as a fountain of military knowledge.

There seems no reason why the organized reserves should not be really National Guards, and at the same time State troops. Each State might be required to furnish its quota to serve for a term of years, as provisional volunteers. These troops should be organized, armed and equipped by the National Government, and submitted to the discipline and instruction provided for by Congress. It is essential that they are to be primarily federal troops, subject to the call of the President, under the authority of Congress. Between such a reserve and the Regular Army there could be nothing but coöperation. There need be no difficulty in securing good officers, in spite of what may be considered a poor system of appointment, as provision could readily be made for examination into their qualifications, and the removal of such as are found incompetent. The National Government should contribute liberally to the support of these reserves, and not, as now, throw the principal burden on the States or on the soldiers. The States now contribute $3,000,000 annually, while the National Government contributes but $400,000 for the organized militia.

Certain benefits and advantages, as, for example, preference for employment in civil service, should be extended, both by the State and general government, to men honorably discharged from either the National reserve or the Regular Army. Such discharged soldiers should be registered and means taken to secure their services in case of war by offers of bounties, preferment, etc.

It would be well for those who profess to fear that a national military force might invite dangers to our institutions which are not to be feared from State troops, to inquire whether the latter might not prove the most dangerous. A very brief study of events in the New England States in 1814 might be convincing in this regard.

As a matter of fact it is improbable that an army formed of the people, created and maintained by and for the people, however large, could ever endanger a government built from the same material and resting on the same foundation. A general liability to military duty that could not be escaped would certainly prevent a war being precipitated by one class that relied on another to fight its battles—a danger to which we are now greatly exposed.

It seems fitting to close these observations by citing the language of one of the strongest advocates of peace among nations. Dr. Wayland says :—

"The cheapest defense of nations, I suppose to be the exercise of justice and benevolence. If, however, a nation resolve upon the employment of military force, economy would direct that both its plans and means of defense should be extensive, scientific and complete."

After mentioning the subjects that should receive attention, including schools for instruction, he adds :—

"In this, as in every other case, economy teaches us that if a given object is to be effected, no expense is unreasonable which is necessary to effect it in the most perfect manner. The manner of its expenditure is to be learned from the teachers of military science."

FEDERAL DUTY AND POLICY AS TO ORGANIZING AND MAINTAINING AN ADEQUATE ARTILLERY FORCE FOR THE UNITED STATES.

By 1st Lieut. H. C. CARBAUGH, 5th U. S. Artillery.

DURING the past few years there have been immediate and threatening signs, in politics and in diplomacy, warning us that if we wish to enjoy peace and hold ourselves unyielding in the support of American doctrines they must be insured by our being ready for war. It is fortunate that our country has undertaken, and is fairly well advanced in, the construction of a comprehensive system of sea-coast defenses including over 500 high-power guns, 1000 twelve-inch mortars and 360 rapid-fire guns, to be grouped at over 110 different points in about twenty-five harbors; that appropriations for over 350 of the high-power guns and as many of the mortars have been made; and that by June, 1898, one-half of the guns and mortars appropriated for can be in their emplacements. Auxiliary to and part of the system are to be 6000 submarine mines, to be operated at will so as to hold the vessels of an enemy under the fire of the heavy guns or to allow the passage unharmed of vessels used for our own defense or for carrying friendly commerce to and from our ports. Official reports show us, as to siege artillery and field artillery, that necessary material for their armament is being manufactured after adopted models.

During the past ten years, Commanding Generals of the Army, Secretaries of War, and Presidents of the United States, have repeatedly made recommendations to Congress urging the reorganization of the artillery of the United States Army with a view of promoting its efficiency. These recommendations have been favorably considered and definite plans for carrying them out have been reported to both Houses of Congress by their respective Military Committees.

The duty of defending the sea-coast, being for the common defense and general welfare of the country, is evidently a federal one and is so recognized by the Constitution and laws enacted under it.

The history of the War of 1812 alone, by the unnecessary destruction of the nation's capital, by the paralysis of business, and general stampede in the coast cities, by the previous apathy of public opinion as to national defense, by the enforced loans and military service locally undertaken in the sea-coast cities, by the sporadic efforts of those cities to protect themselves, and by the general and extravagant rejoicing at the news of peace, furnishes enough reasons why there should be complete federal organization and control of sea-coast defense.

Having due consideration for the opinions of those who are competent to judge, that the artillery of the army is not economically or advantageously organized, and for the degree of progress made in building fortifications and in manufacturing artillery material, the time has evidently arrived when an imperative duty is upon the country to act in adopting a definite and proper policy as to organization and maintenance of an adequate federal artillery force. Such a policy should provide for the necessities of a peace establishment which will be capable of quick expansion into an effective war establishment. Discussion as to what this policy should be, not only requires examination of fundamental principles involved but consideration in detail as to the characteristics and minimum strength of an organization possessing expansive qualities and of the means available for expanding it in the event that the nation be required to defend itself from foreign aggression. Without going too much into details, the following underlying principles and facts seem to call for recognition.

1. Unity of command in defense of a harbor. A harbor is a carefully prepared field of battle containing simple and complex mechanisms capable of being directed for powerful effects.

To develop the probability of obtaining these effects requires a system operated by trained and expert hands, under the control of an experienced and intelligent head.

Our large harbors will have from six to twelve different points of defense, whose guns will be capable of concentration at the will of a general commander. For this reason, and to preserve existing military channels of command, the defense should be under the control of an artillery commander directly responsible in time of peace to the commander of the geograph-

ical department within which the harbor is situate. The present system of independent posts in the same harbor should therefore be modified accordingly.

2. Harbor defense should be unified so as to bring all the parts into a system the operation of which is devolved on a homogeneous organization of artillery. As to this it may be said that the 6000 submarine mines to be planted are essential parts of the coast defense, and their use and defense are duties inseparable from the artillery force charged with defending the harbors, requiring from it in times of peace continuous experiment and work to develop defects and insure familiarity with all details of planting them, keeping them in order, operating them, and defending them from hostile attack.

Unless these requirements are fulfilled there is almost certainty that at the critical moment, as has been experienced by other nations, there will be failure due to lack of material or of men skilled in handling mines in conjunction with other parts of the defensive system. At present the engineer battalion has in charge the subject of submarine mines, but it is safe to say that even the permanent board of engineers on harbor defense would devolve this duty on the artillery. Apparatus for communicating between various parts of works and between separate works in the harbors, search-lights, range finders, electric plants and steam plants, are all necessary adjuncts of harbor defense, which call for trained artillerists and a homogeneous organization for their operation.

3. Maintenance in peace of a force of federal artillery sufficiently large for its expansion by *voluntary enlistment* into a war establishment.

There are those who assert that volunteer organizations, such as members of the National Guard of the States or otherwise, can be organized and trained in time of peace so as to be immediately effective in case of war. They have also suggested different plans for bringing this about. The danger attending these schemes is that on the one hand the amount that would be learned by such organizations and the training they would receive, even if it were possible to organize them, would result—by lack of continued artillery employment—in inefficient organization, and on the other hand would cultivate in the coun-

try an unjustifiable reliance on such organizations for defense, and furnish an excuse for not maintaining an adequate permanent federal artillery force. The subject is one which does not admit safely of half-way measures. On this point General Wingate, President of the National Guard Association, has said: "I do not think very much aid can be expected from the National Guard of the States in the way of an additional artillery force. The National Guard organizations of the States as a rule have all they can do to learn their business as infantry within the time that their members are able to spare from private business. To add to this any considerable amount of artillery duty, even assuming that the States would do so, would be very apt to make them poor infantrymen without becoming efficient artillerists. It should always be borne in mind that while National Guardsmen are willing to give their nights to military matters they cannot afford to spare their days (which are occupied by business). In some States they are able to get a week in camp every year. This is little enough to put the organization into poor condition as infantrymen.

"I think a battery of efficient artillerymen can be expanded into several efficient batteries by additions of intelligent mechanics and others who could soon learn to do the ordinary duties of serving the piece, leaving to those who are well trained the duty of laying the gun and directing them what to do."

The necessity of a large addition of artillerists to the army goes without saying. These men should be of as high a grade of intelligence as is possible to be obtained—fully as high as is the case with engineers. They ought to be carefully trained as gunners, and should constitute the officers and non-commissioned officers, who will control and supervise the artillery force when expanded to a war footing. In other words, they are to be the *scientific* artillerists, while the additions would supply the men and muscle needed to do the work.

Discipline, gunnery, and mechanical ability are essential qualities for an artilleryman.

Of these, gunnery is the most comprehensive quality and the one hardest to obtain. It requires special knowledge and intelligent and special training during a long period to develop in

the individual the degree of efficiency demanded for accurate work with a modern gun.

Such a gun requires a more highly trained gunner than a low power gun, as small errors arising from a failure to appreciate conditions in laying the former, result in very great variations of range. The great value of a well-aimed shot at a critical moment, coupled with the great cost of a single shot (being about $560 for a 12-inch B. L. rifle), necessitates, as a matter of economy, a large number of capable gunners on hand for actual service.

It is an indisputable fact that less than fifty per cent. of the enlisted force of the U. S. Artillery is capable of this training, even when they have the advantages of the U. S. Artillery school at Fortress Monroe. The matter is one of so much importance that gunners should be called upon each year to qualify, and receive, upon qualification, extra pay for the following year's service, and that the artillery force should be maintained large enough to permit judicious selections for this important duty.

An enlisted force of 7500 men, with this inducement and advantage, could not furnish more than 4000 trained gunners.

The complete system of sea-coast defense will contain two thousand guns and mortars, and require a total of about 29,000 men to provide one relief for them; consequently an enlisted force of 10,000 artillerymen could not provide more than three capable gunners for each gun and mortar.

A force of 7500 artillerymen, if at once organized, might be sufficient for the present to care for the matériel, and enable systematic organization of our harbors into defensive systems to be begun, but to provide a less number is but to trifle with the subject.

Such a force, organized into ten regiments of artillery, would have 110 sea-coast batteries and 10 field batteries (there being now 10 batteries of field artillery in the present force).

Taking into consideration the extra officers now in the artillery and its enlisted strength, such a force would not cost more than about *one million dollars* per annum over the cost of the present force.

Ten regiments of artillery would at once provide one regiment for the Atlantic Coast, including Boston Harbor and northward.

One regiment for Newport Harbor, R. I., and the eastern coast of Long Island Sound.

Two regiments for New York Harbor—eastern and western entrances.

Two regiments for Washington, D. C., Baltimore, Md., Philadelphia, Pa., Wilmington, Del., and Hampton Roads, Va.

Two regiments for the Atlantic Coast, beginning with Charleston Harbor, thence southward to include the Gulf Coast.

Two regiments for the Pacific Coast.

4. Fostering the National Guard of the States so as to enable it to maintain a large number of efficient modern equipped field batteries.

The National Guard of the several States and Territories of the United States is now maintained by State appropriations of about three millions of dollars, and federal appropriations of four hundred thousand dollars.

The true aim of the National Guard is to confine itself to having in readiness an adequate force to suppress disorder and furnish a training school for officers and men for volunteer organizations of field artillery, cavalry and infantry in event of national trouble.

To accomplish these purposes modern guns with sufficient amunition to learn their use is absolutely essential. Lack of this armament is especially felt in the field batteries of the National Guard, while the supply of ammunition is inadequate throughout all the arms of the service.

The policy of the Federal Government should be to foster State organizations of field artillery as such organizations would have entire control of their guns and equipments and use it at such times as their business will permit them to devote to it, which is in marked contrast to the inconvenience and cost sure to result from any Federal attempt to foster National Guard seacoast artillery organizations. Such organizations would not have control of the armament and would in fact not be able to see it more than once per year, consequently would, even if organized, soon disintegrate from lack of incentive and employment.

Economy alone dictates that an increased expenditure of about two millions of dollars per annum should be undertaken for military purposes. And it would be well spent if one por-

tion of it should be devoted to increase the sea-coast artillery, another to the reorganization of the present U. S. infantry force and still another to fostering the National Guard, especially the field artillery and supplying it with annual ammunition for target practice.

Such a policy as to expenditure would in an economical way enable the increased artillery force to guard the sea-coast cities on all sides, especially as it would be aided by the excellent infantry organizations of National Guard known to exist in the sea-coast cities. It would supply sufficient federal infantry for the present, for duty at the interior cities, near railroad centres, at strategic points along the Mexican and Canadian frontiers.

In addition it would enable the artillery force to garrison by a number of batteries the more important points in the harbors as practice and head-quarter stations; leaving the other points as sub-posts to be cared for by detachments from the larger posts, would reduce expense and economize in labor incidental to administrating such minor points as regularly organized posts.

DUTIES IN CONNECTION WITH THE ENFORCEMENT OF CIVIL LAW.

By Colonel THOMAS M. ANDERSON, 14th U. S. Infantry.

IN the lectures I addressed to you in our last lyceum course on Constitutional Law, I directed your attention to the relations we bear in common with all citizens to the Government under which we live.

I stated, as a premise, certain fundamental facts and principles well known to all, but which should be kept in mind, since as officers of the Government, we are not only under obligation to obey the laws, but may, under certain conditions, be required to execute them. I made the suggestion that modern authorities on political economy have abandoned the theory that governments are the result of a social contract, but now hold that nationalities are an endogenous growth, a coalescence of people of the same blood, language and traditions, thrown together in the same or contiguous communities. That environment will inevitably develop similar necessities, propensities, purposes and traits. It was inferred from this that in time antagonistic elements will be eliminated and finally a form of government will be evolved as a compromise between the diverse interests of the different classes which make up every state. I recalled the fact that this idea was first clearly expressed by Franklin in the first Colonial Council in Albany in 1765. That our constitutions were not derived from chartered concessions wrung from rulers professing to rule by Divine right, but were all, State and National, made by the people themselves. I read to you authorities to show that our written constitutions derived their force from the fact that they embodied the accepted traditions of kindred peoples, English, Dutch, German and Norse.

The Bible is an expression of the Divine natural law. Its moral precepts are accepted as binding, not because they are written in the Bible, but they were so written because they are true. And so we claim that our constitutions derive their force and validity as embodiments of our legal traditions.

In referring to the fact that our Federal Constitution made our National Government one of limited powers, this judicial decision of Chief Justice Marshall was read: "That although limited in some of its functions, the general government has plenary powers to carry out its duties and purposes. That no trace is found in the Constitution of a dependence on the States for the execution of the powers assigned to it."

Finally I referred you to the opinion of Justice Brewer in the Debs case, to show that our Supreme Court to-day holds the opinions given by Marshall and upheld by Webster. In giving the opinion of the court, he begins by saying: "The National Government derives its power directly from the people and not indirectly through the States."

We have this year to consider our relations as military officers with the civil power and our duties in connection with the enforcement of the laws.

Article 52, Army Regulations, is a statement of laws and regulations governing the "employment of troops in the enforcement of the laws."

Article IV., Sec. 4, of the Constitution, provides that the United States shall guarantee to every State in the Union a republican form of government. What is republican government? To us it means, by almost universal acceptance, a representative government. In its etymological sense, it means the management of public affairs.—*Res publica*—things public. Of late years a suspicion has arisen that representative methods do not always attain their theoretical purpose. In an absolute democracy every man represents himself. This being impractical in a populous state, there must either be a despotic or representative administration.

We began with a ratio of representation of one member of Congress to 30,000 people. After our next census it will be seven times as great. The person is lost in a class and a legislature now represents an interest or a number of correlative interests. Up to this time we have had no difficulty in understanding what is meant by republican.

For a time South Carolina chose her electors through the State Legislature. Within my recollection some States had test oaths and religious proscription. Yet back of all differences

was the underlying principle, "that all derived their just powers from the consent of the governed."

At present nearly all of our States have very nearly the same form of government. They have the same division of functions into the executive, legislative and judicial. With two or three exceptions all have manhood suffrage as a basis of authority. All, I believe, are divided into counties and all or nearly all have similar forms of municipal administration.

But of late there has been a great change in business methods and social relations which may be followed by serious complications. An adoption of populistic or communistic theories may lead to conflicts so violent as to require the intervention of the general government upon an appeal of the State authorities under the last clause of Section 4, Article IV. of the Constitution. There may of course be outbursts of violence from many causes. From political contests, race hatred, religious bigotry, domestic feuds, from sympathy with criminals, from indignation at the miscarriage of justice, from brigandage, piracy and the too frequent contentions between labor and capital, yet there can not be any violence of any kind that is not a violation of some law, federal, State or municipal.

It is the duty of the general government to use its land and naval forces: 1st. To repel invasion. 2d. To put down insurrection. 3d. To suppress domestic violence. 4th. To enforce certain specific statutes.

The first classification does not belong to our subject. The second need only to be referred to briefly. For if an insurrection rises to the dignity of a revolution or rebellion, the subject should be treated under International Law under the classification of Belligerent Rights. These rights and the duties of those who should enforce them have already been discussed by the Judge Advocate of the Department. Where parties in rebellion have established a *de facto* government, have organized armies and have a well-defined habitat, international law and time-honored custom accord them that provisional recognition we call belligerent rights.

As a matter of fact, very few insurrections have received this recognition. In nearly all instances where revolutions have been successful, their success has been so immediate that recog-

nition by foreign governments has been accorded before the question of belligerent rights was raised. There are but few cases where parties to an unsuccessful insurrection have been accorded belligerent recognition. Take for instance the case of the Vendéean revolt against the French Directory, the several rebellions in Poland, the Carlist attempted revolutions in Spain, the Sepoy revolt in India. In these cases armies were organized and desperate battles fought, yet their belligerency was not recognized by foreign powers and the insurgent prisoners taken were not treated as prisoners of war, but as criminals. In all these instances martial law was supreme. Yet we must say that the term is misleading. If law is a rule of conduct prescribing what is right and prohibiting what is wrong, the definition can not apply to the arbitrary edicts of a military commander acting under the sole justification of necessity. Even the so-called law military in the wider sense we are now pleased to give it, is a temporary regulation rather than a law; a method of coercion or restraint following certain prescriptive traditions and assimilating itself as nearly as possible to the *lex loci* but founded on altogether different principles. Under our system of government every military commander becomes sooner or later responsible under the civil law for his acts. In the last resort he has to put in his plea of necessity, which a civil court may pass on as a matter of fact. Every time we put a man in the guardhouse we take our chances on a charge of false imprisonment. Every time we take a cord of wood in war we incur certain responsibilities.

In an article on the use of troops in civil disorders, in No. 85 of the JOURNAL OF THE MILITARY SERVICE, the different policies of the United States and Great Britain on the one hand, and of France, Germany and other European states on the other, is very clearly stated.

The Anglo-American practice is to postpone military intervention to accident or absolute necessity. Our theory is, that we should use military force only when the civil and police force has failed: only when the civil magistrate exclaims: "Help me, Cassius, or I sink." The Germans and French, however much they may differ in all other matters, agree in regarding the necessity of military intervention as a predestined

fact in the order of nature. They provide for its recurrence by an elaborate system of procedure which leaves as little discretion as possible to military commanders. Our assumption is that the people have the faculty of self-government, and that after every temporary aberration of folly or temper they will return to their senses. The continental theory is that the people have not the capacity to run a government, and it is only a question of policy when they should be governed by civil methods or controlled by military force.

Now let us turn our attention to the subject matter of the 52d Article of the Regulations. It opens with an extract from the Posse Comitatus Act which shows that the various Articles quoted in the Article are to be construed strictly. From the severity of the penalty fixed for its violation, we may infer that military power should not be used in any instance until the civil law has exhausted all its resources. Yet every officer who has ever been placed in positions of responsibility on occasions of domestic violence, must be convinced that soldiers are called in as a preventive rather than as a cure, and that the failure of the civil authorities to restore order has been from a neglect to use the means at their disposal. The regular forces may be used for the suppression of domestic violence in the several States and Territories upon application of the proper authorities; or, for the enforcement of the laws of the United States by order of the President, or upon requisition of various judicial officers down to a United States Commissioner in an obscure country village. *Vide* 1984 R. S.

Doubt has been expressed as to whether a Governor of a State can declare martial law. Under our system, the powers of the National and State Governments are limited. The National Government has some functions which are exclusive and a number of powers which are superior. In illustration of this you are referred to Lane Co. *vs.* Oregon, 7th Wall., 76, where the Supreme Court ruled that a State has complete power within its limitations and fewer limitations, the whole charge of inferior regulations being committed to it. It was stated, *obiter dicta*, that the States could exist without the Union, but the Union could not without the States. This case arose on a question as to whether a State could insist on coin for taxes,

notwithstanding the greenback act. Undoubtedly the States have a greater range of powers and more extended functions. "All powers not granted to the National Government are reserved to the States respectively and to the people." It would seem probable that a Governor has the authority to declare martial law in his own State, when authorized by the State Legislature. It has been affirmed by the Supreme Court (U. S.) in *ex parte* Field, 5 Blanch., 82, that the power to proclaim martial law includes the right to suspend the writ of *habeas corpus*. The weight of judicial authority is against the right of the President to proclaim martial law and the suspension of the writ, yet as a matter of fact, Presidents, Governors, and even Department Commanders, have done this on their own authority on the plea of emergency and necessity. (Note.—For authorities see Church on *Habeas Corpus*, Secs. 50, 51, 52, 56; Griffin *vs.* Wilcox, 21 Ind., p. 370; *In re* Collier, 6 Ohio St., 55; *In re* Fagan, 2d Sprague; *Ex parte* Milligan, 6 Wall.; Kemp's Case, 16 Wis.; *Ex parte* Merryman, 9 Am. Law Rep.) When Governor Squire, in the Seattle riots of 1886, declared martial law, General Gibbon at his request arrested and imprisoned an editor of a Seattle paper. The President subsequently approved the Governor's action, yet it would not have availed the Department Commander to have pleaded the proclamation of the Governor in the action for false imprisonment afterwards brought against him, for this was not a criminal proceeding, but a civil action for damages for an alleged abuse of his discretionary authority. Courts have always been liberal in exonerating officers for mere mistakes of judgment, yet we have to be exceedingly cautious in our assumption of authority, and still more careful not to antagonize the civil courts if we are called on to answer for our conduct before them.

A complication may arise when we undertake to act under martial law in a State where the federal courts are yet open. The case of *ex parte* Milligan shows that we cannot ignore the federal judiciary as it is an independent department of the government.

A conflict between the executive and the judiciary should be impossible, for as the latter is the interpreter of the law an executive acting in defiance of its ruling would be liable to impeachment.

Conflicts have arisen between the judicial and legislative branches. The Supreme Court of the State of Kentucky pronounced a certain law passed by the Legislature of that State unconstitutional. The Legislature being determined to enforce the law, first tried to impeach several of the judges and failing in this abolished the court. While the court existed, its interpretation of the law could not be disputed, but after it was legislated out of existence, there was no means of enforcing its decrees. At the next election the people of the State administered an unmistakable rebuke to the Legislature by unseating nearly every member. The court was sustained and re-established, although its ruling had been very unpopular, thus showing how well-founded is the belief that one branch of our governments of balanced powers should not infringe upon the rights and prerogatives of the others. But for our loyalty to this principle, we might have had a renewal of civil strife at the time of President Johnson's contention with Congress. He first tried to get General Grant and then General Sherman to carry out his policy as secretaries of war. When they declined he offered to place General Geo. H. Thomas in command of the army for the same purpose, but Thomas also declined to be made a party to this revolutionary project.

In the case of Luther *vs.* Borden, the Supreme Court decided that in Rhode Island the right to declare martial law rested in the Legislature. But the conditions in that State were peculiar. They were under the form of government granted them under a royal charter. They had never formed a State constitution. The Governor had only the limited authority given him under the old charter. A number of people without complying with the forms of law attempted to draft a constitution and set up a government under it. Martial law was declared by Legislature of the charter government. This episode is known as the Dorr rebellion. Judge Woodberry in delivering a minority opinion, claimed that the State authorities had used an illegal method; that the civil government should have used civil and police methods and only used the militia as an auxiliary. He held further that the writ of *habeas corpus* could not be suspended inferentially and as a corollary to the proclamation of martial law, but that it must be suspended *eo nomine* by

appropriate legislation. This was in 1822. Seventy two years later we have the same theory proclaimed by Governor Altgeld.

In a case of domestic violence, where the general government has intervened, it may happen that some of the State courts may be in sympathy with the disaffected element and may enjoin officers in the performance of their duty. It is needless to say that the right of the local court to interfere cannot be recognized. But it may not be judicious for a subordinate officer to resist the rulings of the local court by force. Where it can be done, it is far better to appeal to a federal court to intervene in your behalf.

Another complication may arise, if after the general government has intervened upon the call of a governor, the State Legislature after assembling should demand the withdrawal of the federal troops; in such a case we would of course continue to perform the duties assigned us pending the action of the President. The question as to when domestic violence has ceased and the laws are no longer obstructed must rest with the same authority. The suppression of every kind of domestic violence, unlawful combination and insurrection, whether a local riot or a rebellion of State or States, is provided for in Secs. 5297–8–9 R. S.

A State whose governing functions have been suspended by reason of inability to sustain itself or by reason of revolt against federal authority cannot be the judge of when it can resume its sovereign powers. This question you will find discussed in the State of Texas *vs.* White. The court held that the State governments, of States once in the Southern Confederacy, set up under the President's proclamation, were merely provisional and that the lawmaking power alone could restore them to their full authority. It follows from this, that the question as to when a military force must be withdrawn after proper intervention must be decided by the general government. There was one other important point decided in the same case. In that of Luther *vs.* Borden, already cited, the court held that it would recognize the decision of the Supreme Court of a State as the proper interpreter of the laws of its own commonwealth. But in the State of Texas *vs.* White the Supreme Court held that it would not recognize the decisions of a court under a provisional government as conclusive.

Army officers are frequently served with writs of *habeas corpus* for alleged illegal holding of soldiers. As a case in my own experience is a fair sample I will cite it. A man named Albert McCoy enlisted, signing the usual averment that he was over 21 years of age. He deserted, was apprehended and his discharge was demanded on the ground that his enlistment was not valid, as he was under age at the time. The action was brought in the Court of Common Pleas of Franklin County, Ohio, Feb. 19, 1880. I argued the case myself, citing the Tarbell case, 13 Wall., and Ableman *vs.* Berth, 21st Howard, and of course held the man under the rulings of the court.

Another case was that of the Catholic Church against the Department Commander and myself in a claim involving 430 acres of this reservation.* It would be foreign to our purpose to review the decision in that case as affecting the rights of the Government. If, however, the Government had not intervened, I would have been liable for trespass and tort. Or, if I had made the ejectment of the claimants with unnecessary violence or with a wanton destruction of property, I would have been liable in civil damages. The Government came very near losing this valuable property, because when the land office was opened in Vancouver, and the Catholic Church filed their claim to this land, no one made any protest or offered any evidence against it. It is, in my opinion, clearly the duty of every officer, when he sees the property of the Government in danger of loss, to defend it himself or report the facts to those whose duty it is to attend to such matters.

We must now examine a little more fully the instances in which the Government intervenes of its own motion. In enforcing the statutes in regard to Indians, we have only to refer to Sections 2118–2147–2150–2151–2152 R. S., and to the Comments of Winthrop, to find our duties and responsibilities clearly defined. The same may be said of the sections of the Revised Code embodied in the Regulations as to Public Lands, Public Health, Extradition and Neutrality. I do not find that they have been changed by later legislation.

Sections 1984 and 1989 will be recognized as methods of

* Catholic Bishop of Nesqually *vs.* Gibbon, 158 U. S., 155.
Id., 15 Sup. Ct. Rep., 779.

enforcing the Fourteenth and Fifteenth Amendments of the Constitution. It was soon found that, in some of the States which had adopted these amendments as conditions precedent to their restoration to the Union, there was a large hostile element. It became necessary, in the opinion of the party in power, to have iron-clad oaths and coercive legislation.

I might dwell at length on my experience as a Military Commissioner and Registrar under the Reconstruction Laws, but it is to be hoped that we will never again have to resort to such methods. Yet, for an intelligent understanding of the subject, we should not only consider the paragraphs above referred to, but also the laws on insurrection codified as Sections 5297–8–9 R. S.

Another class of cases which may call for the use of military force will probably arise from disputed jurisdiction between courts and between contending claimants for legislative and executive authority in State governments. In the latter category was the instance referred to as the Dorr Rebellion. Later instances were the contests in Louisiana and Arkansas.

Still another class of cases in which the federal courts intervene is in the enforcement of the provision of the Federal Constitution guaranteeing the inviolability of contracts, as in the Louisiana Slaughter House cases. Should injunctions be issued in such contentions, as lately in the strikes of the labor unions, the same questions will be raised.

Of late we have had active employment in enforcing Sec. 3995 R. S., prohibiting the obstruction of the mails and enforcing the inter-State commerce laws. The right of the Government to intervene in this class of cases has been considered in another connection. The right of the federal courts to intervene by injunction and punish for contempt has been referred to in connection with the Debs case. But a question of great interest has been raised in this connection. It is, whether injunctions should be executed in a merely negative way or aggressively. That is, whether marshals and military officers are justified in abating nuisances and removing obstructions; whether they can take the offensive and take positive measures of repression. The Supreme Court held *in re* Debs that the right was inseparable from the duty. Justice Brewer said: "The right to forcibly

abate is not inconsistent with an appeal for injunction. Nor does an injunction preclude a criminal action."

As you are aware two of the party platforms in the late presidential contest contain vigorous denunciations of the claim that the writ of injunction can and should be used as a measure of repression or a means of punishment. I do not wish to invite discussion on this subject, yet the principles involved are so important that I will here quote the syllabus of the Debs case:

"*In re* Debs *et al.*
(May 27, 1895.)

No. 11.

Inter-state Commerce—Obstruction of mail—Injunction—Proceedings in contempt.

"1. The Government of the United States is one having jurisdiction over every foot of soil within its territory, and acting directly upon each citizen. While it is a government of enumerated powers, it has within the limits of those powers all the attributes of sovereignty. To it is committed power over inter-State commerce, and the transmission of the mail. The powers thus conferred upon the national government are not dormant, but have been assumed and put into practical exercise by the legislation of Congress. In the exercise of those powers it is competent for the nation to remove all obstructions upon highways, natural or artificial, to the passage of inter-State commerce, or the carrying of the mail. While it may be competent for the Government (through the executive branch, and in the use of the entire executive power of the nation) to forcibly remove all such obstructions, it is equally within its competency to appeal to the civil courts for an inquiry and determination as to the existence and character of any alleged obstructions, and if such are found to exist, or threatened to occur, to invoke the powers of those courts to remove or restrain such obstructions. The jurisdiction of courts to interfere in such matters by injunction is one recognized from ancient times, and by indubitable authority. Such injunction is not ousted by the fact that the obstructions are accompanied by or consist of facts in themselves violations of the criminal law. The proceeding by injunction is of a civil character and may be enforced by proceed-

ings in contempt. Such proceedings are not in execution of the criminal laws of the land. The penalty for a violation of injunction is no substitute for, and no defense to, a prosecution for any criminal offenses committed in the course of such violation.

"2. The complaint filed in this case clearly showed an existing obstruction of artificial highways for the passage of inter-State commerce and the transmission of the mail; an obstruction not only temporarily existing, but threatening to continue. Held, that, under such complaint the Circuit Court had power to issue its process of injunction; that it having been issued, and served on these defendants, the Circuit Court had authority to inquire whether its orders had been disobeyed, and, when it found they had been, then to proceed under Section 725, Revised Statutes, which grants powers to punish by fine or imprisonment * * * disobedience * * * by any party * * * or other person, to any lawful writ, process, order, rule, decree or command," and enter the order of punishment complained of; and finally that, the Circuit Court having full jurisdiction in the premises, its findings of the fact of disobedience is not open to review on *habeas corpus* in this or any other court.

"(*Ex parte* Watkins, 3 Prt. 193; *Ex parte* Yarbrough, 4 Sup. Ct. 152, 110 U. S. 651, etc.")

In conclusion I would say that I have not tried to enumerate all the duties and responsibilities which may devolve upon army officers in connection with the enforcement of the civil law. No one can foresee all emergencies and complications. The best we can do is to study such laws as seem relevant and to receive warning or wisdom from pertinent examples.

The law we appeal to in the rare instances in which the operation of the civil codes are suspended, is the law of Necessity. In one sense it is a higher law, for if the safety of society depends on its exercise, like the instinct of self-preservation, it becomes the first law of nature.

Blackstone calls the common law the perfection of wisdom. We may paraphrase this famous apothegm and say that conscience and common sense give a perfect rule of action.

The only exception we have to the rule of implicit obedi-

ence, is that the order we decline to obey is an unlawful order. This is a question for every man's conscience. But a too sensitive conscience is a dangerous thing for a soldier to cultivate. It too often leads to a crown of martyrdom.

NEW THOUGHTS ON THE RELATION OF THE SOLDIER TO POLITICS, AND POLITICAL OBLIGATIONS.

By Major G. S. CARPENTER, 4th U. S. Infantry.

CONSIDERED merely as the right arm of the Executive, military power is but an instrument in the hands of a superior will. It is passive to the exercise of other governmental functions. Its subordination to civil power segregates it as a power distinctive from all others, executive, legislative or judicial. The personnel of the army, like that of the navy, is so removed in the exercise of its calling, from the vocations of the rest of the nation, that the quadrennial storms of higher politics, involving the interests of the whole commonwealth, give it but an emotional moment. It has but a passing thought for this most important duty of citizenship, and no heed whatever to the elections of the people in its vicinage, of such great import to the home dweller. Military men are scarcely conscious that they have the conditional right to the elective franchise, so uncommon is it for them to find the opportunity to use it. To other men with the opportunity to vote comes a duty, and multifarious motives to intelligent discrimination, so stimulating to the intellect and conscience of honorable men.

But the army is not passive to politics merely from the lack of opportunity. It is so in general, from settled conviction, from an instinctive sense of its peculiar relation as an organization to the Republic.

Our Government is one essentially of political parties; these control in greatest degree the destinies of the nation. Now one party or its opponent may seize the helm of state.

The one, for example, may urge the annexation of foreign territory, or a Monroe doctrine, the other oppose these policies. The policy of the one may unsheath the sword, or that of the other remand it to the scabbard. Whatever policy prevails, to this is committed the administration in power, in whose hands the army is but an instrument. Thus in its best sense the politics of the nation control the uses of the army.

"The politics of our time is touched by passion, without which indeed no politics can prosper, men and patriots being what they are."

For the men of the army to be agitated by opposing arguments, or to be committed to divisions in the heat of political wrangling, would be both unseemly and positively unfitting to the full performance of active duty. The very fact of having been heart and soul in opposition to political purposes, which have come to the ascendant, would make impossible the due personal devotion. An enforced change of political front under such circumstances would invite mistrust, and possibly perpetual suspicion of betrayal. It is the pride and boast of the Republic to be sure that the minority abides the will of the majority, and quietly eats the bitter bread of defeat. But the majority does not thereupon call the minority to its counsels, or intrust to it the enforcement of its policies. It is fitting, therefore, that the army should not be swayed or divided by political agitations. It feels instinctively that whatever administration may be in power, with whatever political policies, it must at every moment be subject to its call to any duty with a whole-hearted devotion unswayed by partisan feeling. It is an unwritten law that the clamor and heat of political contests should pass over it, not like the idle wind, but as the tempest clouds in the heavens pass over an intelligent observer.

But it is not alone from conviction, or a sense of propriety, that the army as a body stands without the network of national politics. It does so by tradition, historically, and generally until now, from environment. Whatever influences in national politics brought on foreign wars, as that of 1812, or that with Mexico, the Regular Army never incurred the suspicion of concerting with any party to incite thereto, or with any, to seek preferment thereby. It has rather gained the plaudits of the

nation by patriotically confining itself to duty in the field. So in its Indian wars, its conduct has been most uniformly kept within the lines of humanity laid down by statesmen, whether wise or otherwise, rather than be swerved to vindictiveness by the clamors of the frontier. Between the conflicts of advancing civilization with barbarism it has held the sword rather of the pacificator, and compelled from the forces of both compliance with the laws of natural progress.

The War of the Rebellion, while it was exceptional, and exhibited the officers of the army (not so the enlisted men) as rent asunder by political antagonisms, after all but shows how mighty were the motives necessary to destroy the cohesive and inclusive influences of the army and navy unique in the Government. At its outbreak no faction within it took sides, or made pronunciamento of its bias, or declared for any leader. Each man stood by the colors, or quietly went his individual way. How different under like circumstances was the conduct of the armies of Rome, of Cromwell, of the French Revolution, of Mexico? Our army to be sure was small and mostly on the distant frontier. So far indeed from the fierce political antagonisms of the hour that whether the men in the ranks would take the road to the North or to the South was questioned with deep anxiety, and interested conjecture in Washington.

So little had the officers of the army made manifest of their course in the coming struggle, that the Government, in continuing or withholding its confidence toward them, was compelled to make nativity its rule of action, which often led to grave misunderstandings and often injustice.

As the enormous volunteer forces of the nation gathered on either side during the conflict; were pounded into cohesive and malleable masses by the fierce hammer of war, they grew less and less subject to the influences of merely political contests. As the pure soldierly spirit rose with the disciplinary power of arms, the causes and consequences of the war were relegated entirely to the politicians.

The Army of the Potomac came to bear the loss of its beloved chief, at what was then called the voice of political clamor, without remonstrance or loss of fervor. That chief whose "main blunder" General Grant has said "was in allow-

ing himself political sympathies and in permitting himself to become the critic of the President, and, in time, his rival." All this but indicates the natural drift or tendency of causes that make the soldier the man of action. The opposing armies of the Rebellion were enthused and brought into being by the loftiest kind of political feeling, that of patriotism, but this in no manner indicates that as armies they were subjects to be swerved at the beck of party politics.

The Army in the South, after the war, during the so-called reconstruction period, was placed where this quality of forbearance was tried severely. Placed amid a jealous and mostly hostile population to execute laws which were enacted despite a powerful minority, and the expediency of which is open yet to historic question, it was called to recreate, protect and enforce civil authority, and with its power military penetrating to every hamlet, mark out the reorganization, on new lines, of labor and social order. The judicial fairness and dignity, the readiness of decision in steering a course between extremes of partisanship, the sufferings under the trials of Klukluxism and radicalism, borne during these trial years by the officers and men of the army, were proofs to the thoughtful that the practices of war tended to broaden the minds of men and emancipate from political bondage. During these times it was common to note that far less animosity lingered between those who had met in the "imminent deadly breach" than continued to fire the hearts of the political firebrands of either side. Soldiers could take each other by the hand across the chasm with respectful emotion.

While it is true that our American soldier has been no politician and has served the administration, be it Guelph or Ghibelline, Whig or Democrat, with equal loyalty, yet he has often been sacrificed to the fetish of party, and been much tempted to worship at its shrine. At the cry of political exigency he has often seen his comrades reduced in numbers, cut off from preferment and promotion, suffered loss of pay, and gone long without pay. Legislation fully considered by statesmen as needful to place the army upon the highest plane of military organization, and suitable to the wants of the nation, has again and again been deferred in the interest of party politics. Identification with the party in power, outspoken and

proclaimed affiliation with powerful political leaders has to be sure been apparent from time to time in individual cases with officers of the army, perhaps, in the hope thereby of personal advancement. But such have been observed generally in exceptional times only, when the moral forces of the nation have been stirred to the very depths. It was so on the question of slavery, when the declarations of conscience were forced by the compulsion of a higher law than obligations of mere discipline.

The temptation to general officers to make the army a stepping stone to political preferment has been great. Throughout its history the army has seen its beloved chiefs seized by this or that political party as presidential candidates; available for this for the most part solely of the laurels won by its prowess and sacrifices. If the merely political general has been a byword and a hissing among the people, the stars won on the field have lighted the path to political honors. On military eminence alone have thus risen to the presidency, Washington, Jackson, Harrison (William Henry), Taylor, and Grant. Because of their laurels have been induced unsuccessfully to venture, Generals Scott (again and again), McClellan and Hancock. Had not martial glory supplemented political qualifications, it is not likely we would have seen in such lofty station Generals Hayes, Garfield or Benjamin Harrison. The Chief Executive of the Southern Confederacy was entrusted with all power because of the faith in his abilities as shown and developed in the army and as Secretary of War. It is unnecessary to mention the throng of men all along our history who have stepped from the ranks to political preferment. With such high and numerous precedents of political exaltation, and the concurrent fact that selective staff appointments have so often come through the personal interest of men in political power, is it not remarkable that party feeling and political excitement has so little permeated or divided the ranks?

Political differences like religious opinions, have been but "as the still small voice," and not permitted as a clamorous disturbance in the barrack room of the soldier or the mess hall of the officer.

Nor has this attitude of the army seemed impolitic or unacceptable to the country. If there is a settled conviction, with

the most, that our judiciary should bear a calm mind, above the ebullitions of party feeling; if there is a settled policy that "offensive partisanship" should be a bar to the civil service, how much the more acquiescent has been the public mind to the political neutrality of those in military service.

By the march of events our soldiery are brought to new conditions, with for the most part a new environment. No longer isolated by a frontier, they are in close contact with the social and political life of the people. What animates and interests the one must to a considerable extent enkindle the other.

Larger garrisons, military tournaments in the great cities, encampments in the field with the National Guard, residence in colleges of scores of officers as instructors, tend we know to fraternization, and we hope the enhanced worth and popularity of the army. Placed thus more in evidence before the people, responsibilities are brought home to them, and to it.

The German Kaiser, with his fight for despotism against democracy, may hopefully "constrain his peasant soldiery with an oath of fealty to honor the king's coat; a soldiery it is more than hinted now having a socialistic majority." But our Kaiser is the majesty of the people. It is the force of public sentiment that makes and unmakes political parties, and their candidates. But our ranks are filled not as aforetime by the homeless foreigner or the hungry tramp. "The American soldier of to-day is a bright, intelligent and fairly educated young man, of temperate habits, and commendable ambition, and as a rule of a prepossessing personality" writes an eminent colonel of the army. He is of the people, from the people, and open to their susceptibilities.

Problems new to our political life are forging to the front, problems financial, social, industrial. Organized capital versus organized anarchy, or corporations against communism, it is alleged, may become a party cry. The forces of disorder, socialistic and nihilistic it is claimed, are surging upon us from the old world, perhaps to appear in various guise beneath the cloak of political party. Some secret societies tend to multiply with ramifications through all classes. Industrial disturbances, labor strikes, the turbulence of mobs, may again more seriously require the mailed hand. Will these ever come in such form,

with such mass of public sympathy to back it, as to shake our ranks from its allegiance? We trow not. The virtues of the true soldierly spirit, of true discipline, of the traditions of the fathers forbid it. But these virtues must be cultivated and kept alive by active recognition and exercise. The officers must not so ignore the social and moral life of the soldier as not to know the mind of the man, his feelings, his prejudices. Reciprocal friendliness, not incompatible with the dignity of office, should be cultivated. Acquaintance is necessary to respect, and respect to influence. Affectionate respect will lead further in the hour of trial than the mechanics of the drill sergeant. Let the officers of the army be as near and dear as possible to the men, that, by their example, these may be proof against the wiles of the devil.

Are American soldiers then to forbid to their eyes and ears all the political life which is adding page on page to history about them? By no means. A knowledge of politics may be as requisite for the performance of the duties of the soldier as the civilian; that politics that concerns the polity of the state, the polities of the Lexicon; the theory and practice of which best obtain the ends of civil society,—that politics that concerns itself with measures rather than men, and which does not bind to partisanship or by party ties. The attitude of an intelligent and dispassionate observer, while it may and should establish opinions, can not swerve from a due sense of duty.

An intelligent knowledge of political forces is as essential to leadership in the army, as in legislative halls. The commander must always calculate as an element of forces the political purposes and aspirations of his own country, and of his enemy. No war is conceivable without its political phases. Cuba Libre or Hispania Gloria, would be the dullest of war cries without their political significance.

General Grant is quoted as saying that General Lee in holding Richmond and even in consenting to the surrender at Appomatox, "sacrificed his judgment as a soldier to his duty as a citizen and the leader of the South. Had he left Richmond when Sherman invaded Georgia, it would have given us another year of war."

But political convictions should not be of so ardent a nature

as to blind military insight. Says General Grant: "The trouble with many generals in the outset of the war was that they did not have that complete assurance in success which belongs to good generalship. They had views about slavery, protecting property, state rights, political views, that interfered with their judgments. A soldier has as good a right to his opinions as any other citizen, but their opinions made them lukewarm, and failures came from that." And again he says "I knew that Halleck was too learned a soldier to permit me to violate the rules of war, and did not report, when I did so at Vicksburg. I knew that the North needed success. This was an ever present consideration with me. For though I took no part in politics and was supposed to be as much of a Democrat as a Republican, I felt that the *Union* depended upon the *administration*, and the administration upon the *victory*."

Was not the vast intelligence, supreme in war, of these great generals, Grant and Lee, made luminous by political acumen?

THINGS WE ARE FORGETTING.

By First Lieut. F. S. FOLTZ, 1st U. S. Cavalry.

THE conditions of service in our army are rapidly changing and our system of instruction is being modified to meet the newer requirements.

No longer confronted with the absorbing problem of opening up a wilderness to civilization and holding in check a savage foe, we have turned our attention to preparation for war with a civilized enemy.

Camps of instruction, marches of concentration, attacks upon convoys, advance guard and battle exercises now occupy us in garrison, where formerly our time was only sufficient to rest the men and condition the animals for another expedition when the grass should be up in the spring.

In the sudden transition from field service to this garrison curriculum we must take care that some of our cunning is not forgotten, that some of our best cards are not lost in the shuffle.

Some of the things that heretofore have not been regularly taught, but which have been acquired no less certainly by force of circumstances, must now become the subject of special thought and training.

These are the things we are in danger of forgetting.

In some cases we find no mention of them in European military writings, for the reason that they are often things that the European soldier has not been expected to know, but which would have added to his self-reliance, and consequently to his usefulness, as they have done for our own men on the plains.

To touch on one or two of the most important things that are slipping from our regular experience, let us first consider camp cooking.

Even where there is no general mess, the good camp cook has become a rare bird. The knowledge gained before an improved army range is not all sufficient.

The management of an open fire of bad wood in a howling

wind or pouring rain is something that must be learned by experience.

The quick preparation of a meal after a long march—wagons getting in late and everybody hungry—another thing that does not come by intuition.

Breakfast at dawn and kitchen packed before the "general" —another field trick.

The packing of wagons has become almost a lost art; witness the top-heavy loads and the damaged articles that we now see. Tents with holes rubbed in them or stained with soot and bacon grease, Sibley stovepipes dented into uselessness, damaged rations, solidified bread or pulverized hardtack.

Drill in packing mules we do have, but we need the illustration of field work, with a pack train to impress the beauties of the "diamond hitch" upon the recruit.

The self reliance of the soldier must now be artificially fostered; our men are too seldom alone.

Man is naturally so gregarious that, when separated from friends, unless habituated to isolation or specially trained for the emergency, he loses his force and the best of his common sense, from the mere feeling of loneliness.

Under modern conditions the trooper is relieved of almost all responsibility, he grooms his horse by order, feeds, waters, saddles, walks, trots and gallops by order.

A sore back can hardly come to his mount under such conditions, and, if it does, another mount for a day or so does not impress upon the rider any sense of his responsibility.

A few years ago I read with a superior smile the suggestion of a French inspector of cavalry, that a trooper should be ordered to leave the ranks of a squadron under inspection and carry a message to another squadron; that a trooper should be required to mount his horse at the stable and ride him away from it singly.

These very tests will soon be quite as necessary for our cavalry as for any other. Our horses are becoming restless when detached from the troop; they neigh, they pull up their picket-pins, they require too much of the attention of their riders, who should be free to attend to their duties as scouts and patrols.

Our men are forgetting how to light fires, how to make a

field bed so as to sleep warm with what they have on the saddle. They have to be cautioned to dry their saddle blankets and prepare the ground for their beds before the sun goes down. They do not know that it is not a soldierly thing to sleep on bare ground when there are dry leaves in abundance.

Some of them do not know the north star nor remember whether they marched into camp from the east or from the south.

Time was when one continual state of readiness found its reflection in the mode of thought and action of officers and men.

There were continual object lessons before us to spur the recruit and officer and to keep the elder ones on their metal.

The ten-days' ration standing lashed beside the pack saddles in the troop store-room, the pile of fat pine-knots ready to fill the crannies in the wagon loads, or the little handful of pine splinters wrapped in a rag in the corner of an old trooper's saddle pocket; all such little things were simply straws showing which way the wind was blowing.

The quiet departure of a detachment on a few minutes warning was the proof that the wind had been blowing to some purpose; men who moved out so quickly and quietly on a scout were not likely to be slow or in each other's way at any time.

There was a greater lesson of duty in this than in all the barrack yard drills we have to work at so hard for the habits of obedience they form.

It may be replied that the days when the field lore I am talking about would be of use, are gone forever.

I do not believe it. I believe that if Napoleon, when he invaded Russia, had had at his back an army of self-sufficient men trained in field lore, such men as have carried our star of empire to the Pacific, the retreat from Moscow, if it had become a political necessity would never have been a military disgrace.

The main benefit of all this field work is the education it gives in self-help and in self-reliance.

To be sure we shall deal, in future, with railroads not trails, we may bivouac in houses and picket our horses on the ground floor. Our scouts may know no loneliness but the worst of all—being alone in a crowd, they may know no wilderness but the wilderness of a disordered civilization.

Admit all this, yet self-reliance learned in the field will still count. You remember how, some years ago during the riots, troops from the plains, with worn-out uniforms patched with buckskin, were suddenly dropped into one of our great cities.

They were just as much masters of the situation as though they had been trained in the "canyons" of the city itself.

They brought their self-reliance with them and soon learned the trails of their new hunting ground.

We can keep our right hands from forgetting their cunning in these matters only by practice, by artificial field duty; we can afford opportunities for experience in our camps of instructfon, in our practice marches. Whenever possible, let detachments camp out and cook their rations; invent emergencies to imitate the old-time scouting parties.

We have still among us some past masters in the art of stowing a wagon to ride the waves of the roughest road; let us give then some apprentices before they are gathered to the retired list and let us "hit the road" often enough to let them exercise their handicraft.

Stimulate individuality and self-reliance, let a troop on the march, where the country permits, disperse in the morning in groups of two or three, with orders to rendezvous at the camping place for the night.

Inspect the men and horses as they arrive in the evening. If, on the first experiment, some men or horses are found in bad condition, let the heavy hand fall on the individual.

After some experiments the unreliable men will be known and can be denied all privileges. They can be dismounted and do all the camp drudgery under the rule that dismounted men are to be preferred for details for dismounted duty.

Most of these men will be found anxious to reclaim their reputations and there will be very few who cannot finally be trusted on these Indian marches.

Later, if the weather is favorable, a camp at several days' distance may be designated, and the small patrols of two and three men be required to scatter over the country, make their bivouacs where night found them, and rendezvous at the given point.

The officers would scatter in the same way and criticise the

conduct of the patrols as they encountered them on the march.

I have heard a good sergeant object to scattering the men of his patrol at a manœuvre, because they would get out of hand.

The same cry was raised when the extended order took the place of shoulder to shoulder.

The remedy lies, not in keeping the men together, but in keeping them scattered until they learn that even more is expected of them when thrown on their own responsibility than when immediately under the eye of their officers.

In marching a larger command than a troop through a thickly-settled country there might be some difficulty in securing suitable camping places, but this, I think, would not be great if the quartermaster kept well out in front.

Market rates for grain and hay consumed on the ground would satisfy the farmer for the use of ground for the camp of a single troop, while patrols would have no trouble about their camps. There is always a corner where from two to six troopers could make their bivouac without hindrance.

Marches do not involve manœuvring over farms; they can consequently be indulged in at seasons when the growing crops would prohibit manœuvres proper; furthermore, they entail no expense, as the necessary transportation is still available at most posts to keep some part of the garrison on the move as long as the weather is favorable.

Supplement such field training as I have indicated with real outpost duty. Let the outpost be established for twenty-four hours instead of two.

Here is the opportunity for training in guard proper as distinguished from the watchman's now performed at most posts under the guise of guard.

Let the outpost camp and cook as in the presence of an enemy, let it learn its duties by night as well as by day, let its patrols cover in the dark some of the ground they have become familiar with in daylight, and let there be a small force representing the enemy to learn how well the duty is being done and what resistance the outpost is capable of offering.

Instead of giving a fictitious importance to ten night watchmen let us learn our guard duty in a squadron as outpost; where

each picket is a guard, and where rivalry, the keenest spur to effort, would stimulate every one to balk the expected enemy.

In open country the duty of the outpost by day would be light, but there is work for patrols, reports and sketch maps to be made, shelters and sleeping places to be prepared, intrenchments begun, obstructions placed, rations to be cooked, and the night work laid out.

Frederick Remington says in a recent article that we can never replace our old non-commissioned officers because the conditions that produced them can never reoccur, unless we make him (Remington) Secretary of War, and let him sell or burn all the barracks and keep the troops under canvas or on the move.

Let us not go so far as to burn our barracks, but let us preserve artificially some of the conditions that produced our old non-commissioned officers, our old officers, and our old men.

Let us not lose all of the old in striving after the new.

NOTES ON LIGHT ARTILLERY MATERIAL.*

By First Lieut. JOHN CONKLIN, 2d U. S. Artillery.

I FULLY realize that a paper upon such a subject as this is scarcely more interesting than would be the reading of a table of logarithms; but many things that have recently appeared in the public prints have lent an interest to this otherwise dry subject. They naturally lead one to inquire as to the tools that we are to use, and to institute a comparison with those that will, or may be, brought against us in case of war. When we read that Germany has thought it necessary to expend sixty millions of dollars to alter her type of field-guns, that Austria is working in conjunction with Germany to the same end; and that France has already accomplished this, and at presumably about the same cost, to say nothing of the warlike reports over the Venezuelan question and the Cuban affair, it would seem that the time has come for us to inquire if we have not dropped behind the times in respect to our light artillery equipment. I believe that this is all the more pertinent from the well-known fact that with us it takes much more agitation, so to speak, to accomplish a desired end than it would in any of the continental European countries. We are not a military people, and in such matters, as in most things, are extremely conservative. From the very fact that we are not an aggressive military power, I hold that it is the paramount duty of the members of our profession to use their best endeavors to the end that what we have should be the very best extant—in organization, personnel and material. In the remarks in this paper, I wish to disclaim any spirit of captious criticism for criticism's sake alone. I know how difficult and slow an operation it is to secure appropriations of money for any new scheme. The supply department to which we look for our ordnance material is occupied at present with the armament of the new fortifications that are growing up along our coasts,

*Fort Sheridan, Ill., March, 1897.

every part of which involves great labor and expenditure of money. For this we are, or should be, grateful; it has been a crying need, and has overshadowed in importance other ordnance matters.

The first type of the field-gun, with which our light batteries are now equipped was designed in 1885, it was late in 1892 or early in 1893 before the last of our ten batteries was supplied with it. The later type, that of 1893, differs only in the details of manufacture. We can see from this how slow a matter it is to make a change of armament in time of peace. In time of war it is altogether too late to think of radical changes; it would be suicidal to make any at all, except in minor details. We have two calibres of field-guns,—the 3″.2, the one now in use; and the heavier 3″.6, some of which have been manufactured but none issued to the service.

I give the principal elements of both:

	3″.2.	3″.6.
Weight	829 lbs.	1181 lbs.
Charge	3.½ to 3.¾ lbs.	4.½ "
Projectile	13.½ lbs.	20 lbs.
M. V.	1685 f. s.	1550 f. s.
Pressure	35000 lbs. per square inch.	35000 lbs. per square inch.
Muzzle energy	266 ft. tons.	333 ft. tons.
No. of rounds in piece limber	42	———
No. of bullets and frag. in Shrapnel	201	———
Weight per horse (field battery)	760 lbs.	865 lbs.
Remaining velocity at 2500 yards	887 f. s.	———

Referring to those elements which affect the efficiency of a field-gun, I quote from a paper read before the Congress of Engineers during the Columbian Exposition, by Captain Moch of the French Artillery. "I will cite the following which is by no means a complete enumeration. The living force which the projectile possesses upon arriving at its destination, its remaining velocity of translation and rotation, its weight, its interior

constitution and that of its fuse, the number of shots that the piece can fire in a given time, the supply of ammunition that can be furnished it, the mobility of the gun and material that will permit it to be moved as rapidly as possible to the most favorable emplacement, its simplicity of construction rendering damages rare and easy to repair."

Among so many conflicting requirements discussed and urged with all the heat of argument, *pro* and *con*, by the greatest experts of the world upon this subject, it is an almost hopeless task to gather up the threads and come to a decided opinion as to what is best. However, I think it can be easily seen that we are, at the present time, behind in the race. Some change is necessary, and that soon. I give tables corresponding to the above, of two foreign field-guns, if indeed, the Hotchkiss gun may be considered foreign.

HOTCHKISS RAPID FIRE FIELD-GUN.

Calibre	2″.95
Weight	792 lbs.
Charge	1.76″
Projectile	13.2″
No. of bullets and fragments	231.
No. of rounds carried	48.
Weight per horse	580.
Remaining velocity at 2500 yards	992 f. s.

Next we will consider the Spanish field-gun of the Sotomayor system. This has an especial interest for us at this time; as judging from current reports, ours may be pitted against it at any moment.

Calibre	3″.09.
Weight	770 lbs.
Weight of projectile	14.33 lbs.
No. of bullets in shrapnel	231.
M. V.	1509 f. s.
Muzzle energy	226 ft. tons.
No. of rounds in piece limber	36.
Weight per horse	601 lbs.
Remaining velocity at 2500 yards	882 f. s.

Looking over these tables, we see that our light gun, the one that we are using at present, does not compare with the others specified, in its power as represented by the shrapnel used; and when we consider the superior mobility of these foreign pieces, the conclusion is inevitable that something must be done to bring our material abreast of the times.

The first question that occurs to me is—ought we to have guns of different calibres in our light artillery equipment? Looking backward, in the light of history, this is easily answered in the affirmative. During the Civil War we had guns of different calibres served side by side in the same battery. In foreign services we have often seen three different calibres—the heavy and the light guns of mounted batteries, and the horse artillery gun. But the tendency seems lately for uniformity of calibre for all light artillery—this is in the interest of simplicity.

Our drill regulations, agreeing with all others that I have knowledge of, specify that: "The entire artillery comes into action at the earliest moment to engage in the artillery duel." Again: "Whenever practicable the batteries * * * come into action simultaneously," and "all movements to the front are made at as rapid a gait as possible." To conform to these requirements great mobility is necessary, and this, in my opinion, it is impossible to obtain to a sufficient extent, with the heavy guns known in foreign services and our own, as heavy field pieces. We have already seen that our 3″.6 gun, using the carriage, limber and equipments of the light one, would give 865 pounds per horse, and the caisson carrying the same number of rounds now prescribed would give 1050 pounds behind each horse. When we remember that at least three of the horses carry drivers averaging about 150 pounds in weight, and harness 70 pounds more, we cannot expect any great mobility with this arrangement, especially as we must take as a measure of the efficiency of a battery in this respect, that of the least favorable part, *i. e.*, the caisson.

It is not a question of ordinary marching to keep pace with the infantry, it is much more. The batteries must be able to take the rapid gait when called upon to leave their places in column, generally well to the rear, and deploy in line to be of the best

service; and this over all kinds of difficult ground under the most adverse circumstances.

Another advantage of a single calibre is the great one of simplicity in the ammunition and its supply. I cannot imagine a more disappointing or truly demoralizing state of affairs than to have a section of the ammunition column appear with a supply of 3″.6 ammunition for batteries armed with the 3″.2 gun, or *vice versa.*

It is claimed by some that a part of the batteries, say all of the corps artillery, should have the heavy gun. I am of the opinion that any advantage of the double type is outweighed by the objections to the system, *i. e.*, lack of mobility and confusion of ammunition supply. I thing it feasible to use one gun for both field and horse batteries; I mean by this a gun that would take the same ammunition. To do this satisfactorily we should change the weight of the projectile to give us more power for the ordinary field battery than our light gun possesses at present, at the same time looking toward its mobility; and for horse batteries this must be considerably greater,—to be obtained by minor changes in the carriage and limber, decrease in number of rounds carried, or perhaps by shortening the gun somewhat. We *must* have a greater mobility for this service at all hazards.

The Ordnance Department has been experimenting for more than three years with a shrapnel weighing sixteen and one-half pounds, using metallic cartridge case and smokeless powder. A charge of one and one-half pounds gives an initial velocity of 1525 to 1550 f. s. The case would weigh about one pound,—that of the Hotchkiss gun referred to above weighs .82 of a pound with a thirteen pound projectile. This would make the entire weight of a round of fixed ammunition about nineteen pounds. Ballistically it would be much superior to that now in use. With sufficient charge to give 1525 f. s. initial velocity, the muzzle energy would be the same as at present with our thirteen and a half pound projectile and 1685 f. s. muzzle velocity; but at real battle ranges, say over two thousand yards, the remaining velocity for the proposed shell is greater.

The number of useful projectiles,—bullets and fragments,—would be greater by from twenty to twenty-five per cent.

Eventually, I have no doubt that something like this will be adopted; but I claim that we have no time to lose. Let us have it before we obtain so many of the present type that Congress will not consent to a change on account of the expense involved.

If a metallic case is used, the gun, of course, would require a different chamber and breech mechanism; but it is believed that the heavier projectile could be used with the present gun without any change except as to the powder.

With the same number of rounds as now prescribed, this would give 790 lbs. per horse, with the gun, in a field battery, and 950 lbs. per horse with loaded caisson,—all that is consistent with a proper mobility.

The carriage that we now have is said by the Ordnance Department to be able to stand the recoil due to 333 ft. tons muzzle energy of the 3″.6 gun. If this be true, there can be no reason why it should not be made lighter to stand the 266 ft. tons, with the proposed projectile. This should be done, especially for use with the horse batteries. Even if it is not, we could have each gun limber carry thirty-five rounds, each caisson sixty-seven (making 135 rounds per gun, the same as in the German service), and thus reduce the weight per horse to less than six hundred pounds. For ordinary service, this it is thought would be a sufficient supply; on special occasions the number of caissons could be increased to twelve per battery. So much for the amount of ammunition carried. As to the character of the projectiles, the tendency has been all one way for several years,—that is to increase the importance of the shrapnel shell. And it is safe to predict that this projectile will probably replace all others for light artillery,—a result much to be desired. The use of common shell against field works is by no means worth the time and powder expended. Against animate targets the shell in its best form has never been comparable to our modern shrapnel. There only remains its use for ranging. There seems to be no good reason why shrapnel, either ordinary or special, should not be used for this purpose, as indeed it is, even now, by the French. Shell do not range the same as shrapnel on account of the nose fuse used with the latter. By having one projectile the operation would be direct

and simple. It may be necessary to use some smoke producing substance with the bursting charge to facilitate observation. The use of shell in field-guns is a tradition, and it will be hard to remove the idea of its necessity; but when there is such evident need to conserve all the energy of the teams, as well as all the space in the wagons, we cannot afford to pay any great attention to that which is mere sentiment.

Germany, I believe, has adopted a shell charged with a high explosive, for use against troops behind cover. It is a special projectile for a particular purpose, and in any event only a small number would be carried. If it is finally shown that they are efficient for the purpose named, it would be well to have some within reach; for shrapnel is at its worst against troops behind a parapet, at least that is what I judged from a season's practice at Fort Riley. A few canister might also be carried for possible use at extremely short ranges. Even then, they would not be necessary if the fuse could be cut for the shrapnel at zero, so that a burst could really be gotten at the muzzle. This seems to be impossible with the present form. It leaves much to be desired, and its failures and limitations have been often discussed. From my observation of one season's practice of the three light batteries at Fort Riley, I believe that there were at least ten per cent. of premature explosions or failures of some kind. From this alone it would be dangerous not only to fire over our own troops, but even to fire by them when very near the flank of the battery. The graduations of the time fuse are not small enough. For instance, when cut so that the burst was too far in front of a particular target to have any material effect, an increase of one-sixth of a second would often carry the shell beyond the target before bursting. The only remedy was then to run forward the guns, manifestly often impossible. I believe that the authorities think of giving us a new sight. It is to be hoped that this is true. A division of the deflection scale now gives a correction of 1/345 of the range. Why such an unusual and confusing fraction was ever selected it is difficult to see, unless it was for the mental discipline of the gunners during practice.

There is one part of this subject that, at the present time, seems to call for more attention than any other,—that is the use

of rapid or quick firers. If reports are to be trusted, it is for this that France and Germany have made or are about to make the great expenditures mentioned above.

Rapid-fire guns have been used in the Naval service for years. They may be defined, briefly, as guns with a special breech mechanism, firing fixed ammunition, and mounted upon carriages such that the recoil is taken up to such an extent as to render it unnecessary to relay the guns between rounds.

The question is,—can we get a field-gun that will fulfil these conditions? I have seen, both during manufacture and in use, many of the breech mechanisms that have been presented in this country for this purpose. The Dashiell, Seabury, Fletcher, Driggs-Schroeder and Hotchkiss. The first three are for the slotted screw breech-block, and for guns of the calibre of our field piece, I have no doubt that that is the best. All these systems are good. They are strong and simple, one motion unlocking, withdrawing and turning the block. Personally, I believe the Fletcher system to be the best. As to fixed ammunition there can be no trouble.

When we come to the carriage that will fulfil the conditions, we are met with a more difficult problem. With the Navy guns they make use of hydraulic buffers and strong springs that return the gun automatically. This has been tried for field-guns, but the objections are that the weight is materially increased, and the whole arrangement is too complicated for rough field service,—both certainly valid and well-nigh fatal objections. For the Hotchkiss rapid-fire gun, only a spade at the end of the trail is used, and it is claimed that in ordinary ground this serves to take up all the recoil after one or two rounds have been fired. Used in conjunction with our excellent firing brakes, I believe that this would work for our carriage, at least to such an extent that, for the ranges where rapid fire would be most employed, the work of relaying would take a very short time.

These guns are capable of firing from six to ten aimed shots per minute. With our present system, where the gun has to be run up after each fire, it would require, under favorable circumstances, one minute or more per round.

We shall probably pass through about the same round of arguments as were brought against the adoption of the maga-

zine rifle; but I think with less show of reason on the part of the objectors. The control of fire of artillery is always with an officer, the cannoneers are not as apt to give way to nervousness as their infantry brothers who have been rushing forward and back during the heat of the battle, and even if they do it would not affect the rate of fire; so the main objection, that of a waste or throwing away of ammunition, cannot hold good.

The officer would order rapid fire only upon very special occasions, such as the decisive moments in an action, at short ranges, or against a moving target. In such cases, the moral effect of a great number of shrapnel fired in an extremely short time must be given its full weight. I know of no better application of that very expressive and forcible remark of the Westerner, when he stood in need of a gun, than to this very case of artillery when it wants to shoot quick and often.

There are many minor advantages that might be mentioned in favor of the rapid fire type,—as the prevention by use of the cartridge case of any premature discharge. To be sure they would never be frequent, but it is thought that a man who had ever seen or been near one of them would always thereafter be more or less nervous. Again the powder charge is much better protected, indeed almost perfectly so, in its case. The guns could often be placed in a more advantageous or better covered position, if there were no danger of their being kicked down a side hill by the recoil. And more than all, the cannoneers would be saved the great fatigue due to the running up of the pieces after each fire. If the device of the spade on the trail will not work successfully it is believed that our ordnance corps can devise something that will prove efficient without unduly increasing the weight.

To sum up, I have tried to make the following points:

1st. We stand in need of changes in our material to make it equal to that of foreign countries, and they should be made as soon as possible.

2d. In my opinion, the horse artillery and field-guns should be of the same calibre, securing the necessary mobility for the former by changes in the carriages and limber, shortening the gun, and, if necessary, decreasing the amount of ammunition carried.

3d. Our shrapnel should be increased in weight to sixteen or seventeen pounds.

4th. Shrapnel should be used in ranging.

5th. Our fuses and sights should be improved. A good telescopic sight would be a great boon.

6th. Field-guns from this time on should be of the rapid-fire type.

In closing I cannot refrain from quoting from an address delivered by Captain Pilcher, of the British Infantry, in March of last year.

He says: "Modern guns firing shrapnel have never yet had an opportunity of showing what they can do on a battle-field; and one of the first surprises of the next European war will be that we shall hear that artillery, under favorable conditions, have within a quarter of an hour swept away half an army corps."

TRAINING OF COMPANY COOKS.

By First Lieut. M. L. HERSEY, 12th U. S. Infantry.

"We may live without poetry, music and art;
We may live without conscience and live without heart;
We may live without friends; we may live without books;
But civilized man cannot live without cooks."

THE application of these often-quoted verses to a soldier's mess may be something new, but in this essay on "The Training of Company Cooks," I am not flattering myself with the idea of originality.

My first observation is that the company commander is the one to do the training of the company cooks; that the success of the mess depends on his personal management; that he himself must have both a theoretical and practical knowledge of what can be accomplished with the ration; that it is not enough to walk through the kitchen in the morning after it has been cleaned up after breakfast and before it is littered up in getting dinner to see if the kitchen floor is clean and ask the cook what he has in the oven.

It is the company commander's place to *know* what should be in the oven and to see that it is there being cooked at the right temperature. If this management is left solely to the first cook, to the first sergeant, or to any other non-commissioned officer, and the company commander is merely a nominal supervisor, the mess promptly degenerates. Consult with successful hotel men who cater to from fifty to one hundred per meal. Their success depends mainly on personal supervision of the cooking; during meal hours they are seldom out of the kitchen. This I know from personal acquaintance, and in larger establishments like duties are performed by stewards of brains, intelligence and high salaries. There may be cooks in the army, it is possible, of course, who need no supervising, who are both economical and competent, who, actuated by a high sense of duty, will do just as well without the watchful eye of an interested company commander as with it, but I

have never seen one. I bear in mind one soldier's statement to a court, "You can't expect an angel with wings for thirteen dollars a month."

In other walks of life the good messing of sixty men commands a high grade of intelligence and attention to business; in the army such qualities, as a rule, must come from the commissioned officer. I have found that by relaxing vigilance for a week or even less, the mess suffered accordingly, in fact, as soon as that relaxation was realized in the kitchen. You cannot have a system so perfect that it will run itself. The best of machinery has to be oiled regularly, and the best kitchen arrangement is the machinery arrangement where the company commander furnishes the brains and each of the kitchen crew does his allotted part. It has been said that cooks, like poets, are born, not made. This statement has been a stumbling block, and I believe there is very little if any truth in it. Good cooking is a question of neatness and attention to detail. Given a man who has had his training as a soldier, that is, a neat man, with average intelligence, even without present arrangements, he can be made a good cook in three months' time, a cook that in civil life would command forty dollars per month, probably, cooking for a crew of laborers. Seventy-five per cent. of the men of this command could, I believe, attain that degree of proficiency in that length of time. Rotation in the kitchen is best for the army; men that have had their intellects brightened in the kitchen are the best candidates for non-commissioned officers. It puts much more work on the company commander, I admit, to change cooks every two or three months, but increased efficiency must result. Our surgeon says of one troop of the 7th Cavalry that every man in it is a cook, a good cook. Such an organization can be sub-divided, detached, sent anywhere, with a probability of health and effectiveness, where another with its one or two cooks, and they possibly little used to the field, would suffer, if in detachments, and become largely non-effective, simply through ignorance of how to make the rations fit to enter that all-important organ, the stomach.

In Army Regulations, Par. 280, we read: "In camp or barracks where companies are not joined in a general mess a com-

pany commander will supervise the cooking and messing of his men," and in A. R., Par. 281 : "Kitchens will be placed under the immediate charge of non-commissioned officers who will be held responsible for their condition and for the proper use of rations." Here we are likely to have a case of "too many cooks spoil the broth," or else the non-commissioned officer in charge of the kitchen becomes merely a figure-head. I have tried changing the non-commissioned officer in charge of the kitchen monthly and I have tried keeping the first sergeant in charge permanently. The latter I believe the preferable method. In the former case, putting a cook who is competent under the orders of a non-commissioned officer who probably has not been a cook for many months, and perhaps never, is to give the cook a contempt for this non-commissioned officer's orders if he attempts to give any ; or, what is more likely, the non-commissioned officer himself will feel out of his sphere, will leave everything to the cooks, and if anything goes wrong, realizing his own inefficiency, will fail to report it, or if it is discovered, will try to shirk responsibility and find somebody to whom he can impute the blame. If the first sergeant is in charge his position is such that if not competent to take charge of the kitchen at first he will soon make himself so, his orders are bound to be respected, first of themselves and again because he is looked upon as the mouthpiece of the company commander. At the usual morning hour have the making out of the bill of fare for the next day part of the daily routine, post this bill of fare in the kitchen, and see that there is no deviation from it without cause and authority. Plans, discussions of ways and means, what to buy, what to sell, can all take place in the orderly room and the result in the bill of fare goes to the kitchen as orders. The training of the kitchen crew begins in the orderly room. The drill regulations for the kitchen, so to speak, are made out there, the drill ground of course is the kitchen itself. Having in mind a promising man for a cook, or taking some man who has asked for a kitchen detail, I would give him first, as a test of his ability to keep things clean, a tour of a week as kitchen orderly, that is, a position entirely independent of the regular kitchen police, the duty of which is to keep floor, windows, woodwork and range clean. If any out of way

corners or tops of water pipes are overlooked or the lesson otherwise has not been thoroughly learned, give him a second week, then if proven competent assign him to the next vacancy as third cook, with sole care of the dining-room and dish-closet. He should be so familiar with the dishes that when setting them away after they are washed he would note any new nick or crack, report it at once that the responsible party may be charged, if the occasion demands it, not waiting till a cracked dish falls to pieces and then charge it up to the man in whose hands it happened to be.

At the same time he should call the attention of the non-commissioned officer in charge of the mess to any dishes not properly washed or glasses, if used, left dingy in the wiping. An extra tour of kitchen police for careless dish washers remedies this fault and the effects of such a lesson are reasonably permanent. The third cook is substitute for any vacancy above, for a day or two, and if interested in learning to cook, as it is safe to assume he is, he will seek every opportunity to learn the duties of the second cook, which place, if he has kept up his reputation for neatness for a month in the dining-room, he is next given. There he feels he is actually beginning to learn the trade he is seeking.

The first responsibility I find it advantageous to put upon the second cook is the care of the dishcloths and dish wipers; teach him to look upon a greasy dish rag as an abomination, and it is safest to assume that a dark colored dish wiper is a filthy one. For this reason I have discontinued the use of the usual flour sacks as dishcloths and buy crash towelling from the commissary, being sure to get the white and not the colored crash. This, hemmed in yard lengths, is most convenient and after being used once should be washed and preferably ironed before using again. By washing I do not mean simply rinsed out by the kitchen police, but sent to the laundry. A dish wiper that has done service for fifty or sixty men deserves this treatment, and for a man not accustomed to wiping dishes more than one of these wipers is necessary for each meal. I am not advocating that the second cook should be the dish washer by any means, but simply that he should supply the kitchen police with clean cloths, plenty of them, and take care of the dirty ones. The next responsibility I put

on the second cook is to make him watch over the swill barrels, watch what goes in them I mean. This at the same time is a most important lesson in his education as a cook. It is a great lesson in economy. When the swill was cared for in a haphazard way, each of the kitchen crew dumping in what he thought best, I found the company swill in great demand by neighboring farmers at from $2 per month upwards; now that it is in charge of one man and he directly responsible to the company commander, it is hard to sell it at any price, but the $2 per month formerly obtained is a drop in the bucket compared with the value of the savings. As a people we are very wasteful of our food. It is said that the amount of food that the average American family wastes will enable a French family of the same size to live better than the American family. Why? As a people the French are good cooks, economical cooks. We are undoubtedly improving, but it is still true that as a people, we are poor cooks, extravagant cooks. Now our army ration is a scientific ration based on the needs of a healthy man, ample if properly handled, but the margin for waste is small and if not carefully looked after some men go to bed hungry, especially where early suppers are in vogue. Here our post exchange with its large dividends may make good the shortcomings of company cooks, but where we can now live well notwithstanding waste, a careful watch on the swill barrels will enable us to do better, in a marked degree. One thing I found going into the swill was ends of loaves of bread. It is a fact that the crusty ends are not often eaten when put on the table plain. In plum duff for Sunday dinner was the only way I found them being used and there are three hundred and fifty of these crusts per week. Bread pudding, sometimes as often as every other day, milk toast, butter toast, ends cut into half inch cubes fried crisp and dropped in soup when served, saved these bread crusts from the swill. I found one cook foolish enough to throw suet away. Making suet cake of corn meal, trying the suet out and using it with lard he found much more to his liking after one interview. Another waste is in bones from which steak had been cut off or other bones rich in marrow. The value of these bones cracked and boiled in soup stock is a lesson that has often to be repeated. But the greatest waste of all is from the plates of those men whose eyes

are bigger than their stomachs. This is constant and of course cannot be wholly eliminated. A statement of the case to the company that a quarter of a pound of food per man per day, left on their plates, small as it is per meal individually, yet means a hundred pounds of food per week thrown away, which if saved brings enough to purchase a Sunday dinner of the first order, puts the matter before them in a way to be appreciated and is, I find, to a noticeable degree effective. An exceptional amount of waste in any one plate is to be reported, then if the food is at fault, remedy that; if the man is plainly careless, discipline him—letting the same plate untouched appear before him at the next meal works well.

All this work of watching the wastage is excellent training for the second cook. It is not absolutely necessary that all the company have the same dishes at each meal. If hash is left from one meal, save it; also do the same with toast, roast, stews or soup, then, once in a while (whenever necessary), follow the custom of the thrifty housewife, and have a meal of odds and ends. More than half our dishes are better warmed up a second time, and few lose anything by it. This means a meal that really costs nothing, gives an extra or unusual course in the dinner next day at no additional expense (I am assuming here that the mess is run on a fixed basis of so much per diem). Another way of disposing of these odds and ends is to put them on the next meal with the regular bill of fare. It is pretty certain that some out of sixty will prefer whatever is thus offered to the regular meal prepared by order. To prepare palatably and invitingly a meal from what without his care might have been thrown away is a good lesson for the second cook early in his career, and one calling mainly into use the neatness and economy it has been the main purpose thus far to impress upon him. Of course, here as always in the kitchen, he has the assistance, experience and direction, if necessary, of the first cook, who has been over the same ground ahead of him. Roasting coffee properly is one of the earliest lessons. I found that with the greatest care, roasting in the oven and in our large pans, some kernels were underdone and some burnt black. About six months ago the quartermaster made us a coffee roaster, a cylindrical affair, after the plan of the street roaster of the

peanut-vender. An illustration of a similar one is in the "Manual for Army Cooks," just issued. This roaster is equally adaptable to garrison or field, and has proven a source of economy, of comfort, and, above all, of improvement in quality of this staple article of the ration. Bitter coffee is a thing of the past, and the problem of roasting is now simply one of slow and constant turning the crank over a slow fire. In the making of coffee it is necessary to impress on nearly every cook that boiling is an abomination, that slow steeping produces far better, healthier results. In fact, I believe the most excellent coffee is made by steeping the ground coffee all night, or ten or twelve hours in cold water, then drawing it off the grounds and making hot. In this connection, the excessive use of bad coffee, I once heard Major Pope, surgeon in the army, then at Whipple Barracks, Arizona, say that in his army experience he had seen as many cases of delirium tremens resulting from coffee as from whiskey.

As it is too much for the first cook to get up at half-past three or four o'clock every morning, the second cook has from the start to get breakfasts alone. His standard article is hash. As we all know there is hash and hash. The well-browned, finely-seasoned hash, with flavors as varied as the dinner of the day before, the same in name but varied in substance, can be presented to the satisfaction of all concerned oftener than anything else on a bill of fare. It may possibly be too dry or again too moist. If too dry, the remedy is self-evident; if too moist, here is another opportunity to use up those now very useful bread ends by toasting and chopping them, when they absorb finely. If baked potatoes are left in quantity for breakfast hash, the skins should be removed before setting them away, otherwise the strong flavor of the skins is noticeable. The favorite onion performs here an important part.

Please do not take this for a receipt-book. I am here simply mentioning things that come early in a company cook's education, things that need the personal care and attention of his instructor, things not best taught by books. The knowledge acquired in making hash comes right into play in another good breakfast dish, a meat stew. Here the same ingredients, instead of being chopped fine in a machine, are cut coarse by hand with

a knife. The question here is the proper cooking of the meat. The way cooks are prone to fall into, is to boil furiously for an hour or so, producing a tough, tasteless result, whereas for a stew the pieces should be put in water not hot and cooked slowly below the boiling point for many hours, covered tightly; the result, even when the pieces are cut from the toughest old neck, is deliciously cooked and tender. The ideal way, I think, for a breakfast stew is to put the small pieces of meat on in plenty of cold water after supper is cleared away, bank the fire, the cook looks in when going to bed, or otherwise leaves it to its fate. The cook can go to sleep with the assurance of a good breakfast easily prepared in the morning.

When "B" Company was making the ice pond dam last June we had an experience with oatmeal breakfasts that emphasized the value of oatmeal as a breakfast dish. While engaged in this work the men at first ate fifty per cent. more than under ordinary circumstances, and throughout averaged twenty-five per cent. more. We paid particular attention to breakfasts to give a good foundation for the day's work. When oatmeal and milk was a part of the breakfast, they came up for dinner in about a normal condition of appetite; otherwise they were ravenous. The use I make of this lesson is to have oatmeal in the breakfast ménu whenever any unusual exertion is called for, days for our practice marches, for example. Care of vegetables in the cellar the cook should realize as a part of his trade; the toning up of vegetables in cold water; to get rid of his beets by January (trying how to make them palatable later is to attempt the impossible), all these preliminaries and beginnings of cooking knowledge are distinctly the province of the second cook, but should be taught him from day to day rather than heaped upon him all at once.

Considering the first cook, the company commander knows when he goes into the kitchen, from the bill of fare he himself has made out, what is being prepared for the day, and knowing this, can know where mistakes, if any, are most liable to occur. To teach rather than to find fault, is in general his province. For instance, boiling meat, which, by the way, should be a misnomer, the tendency is always to have too hot a fire. Putting meat into boiling hot water for five minutes coagulates the albu-

men on the outside of the meat, and so retains the juices and is the correct way to cook it, but if continuously boiled it becomes hard and indigestible. Lt.-Col. Woodhull, Surgeon U. S. A., states in his "Military Hygiene" that the so-called boiling of meat should be done at a temperature below 170° F., that is, at the least 42° below boiling point. Kitchen thermometers should be furnished us. Anyone can buy them for thirty cents. However, without these we are on the safe side when we cook in water hot, but well below the boiling point. Another point, this cooking of meat should be done with as large pieces as practicable, otherwise the result becomes similar to meat prepared for a stew, which is quite different from boiled beef, so-called. Now, many of our men are interested in these things; they want to learn to cook for the practical value of the knowledge, for the sake of the trade, possibly, and they listen with interest and attention to these points.

In baking, the same principle applies as in boiling; introduce meat to a hot fire for the same reason, and then reduce the temperature. To still further retain all the juices in a roast of beef, and if a tough piece to make it tender, cover the roast with flour and water made into a cold paste, a trick easily taught and a valuable one. In making soup stock, cracking the bones and thus dissolving more of the marrow adds much to the richness if slowly cooked. I have talked about skimming the grease from soup with little avail. Soldiers seem to like soup best greasy. Seeing nothing unhealthy in this liking, I have given up the skimming. Desire for soup seems mainly limited to cold weather. In connection with soups, attention is called to that commissary staple, split peas. At the present time they are on hand here, but in the past I have called at our commissary for them and have been told that there were none on hand, for the reason that there was so little call for them. This failure to make pea soup I am sure is a mistake. It is well recognized as of great nutritive value, and is, I find, extremely well liked. Beans are another article of the ration that are often improperly prepared, and mainly through ignorance. Another case of too quick cooking. Nine hours is a minimum for cooking beans, and twelve hours are better. A slow fire is imperative. Better results are obtained by heating a hole in the ground, then cooking

in a Dutch oven solely by means of the heat retained in the ground. My first experience directing the cooking of beans thus is a well remembered one.

I left Fort Mojave, Ariz., with ten men and twenty days' rations. The sergeant I had with me did not want to draw any beans; said no one liked them. The first night out we baked beans in a bean hole in the Dutch oven, the twenty days' rations of beans were gone in three days and more were bought at the first town we struck. On the march they are especially advantageous; cooked overnight, taken along in the Dutch oven unopened, you have dinner ready immediately upon making camp or upon halting for dinner. Winter weather excepted, without even getting out the mess chest, beans for the noonday meal can be dished out of the back of the wagon, still warm. As an article of food that men hard at work do not tire of, they have no equal. Men in the lumber camps are given baked beans three times a day from fall until they come off the "drive" in the spring, and will complain if they do not get them. For men of sedentary or only moderately active habits baked beans, rich with pork as they are at their best, are too hearty for a daily diet. Beans can not be baked properly in our open mess pans. Stone jars that retain the heat, or better, brown earthenware bean pots holding at least four quarts must be used with the army range. A year ago on our practice march I tried the extension oven invented by Musician Marcel of "G" Company, 12th Infantry. Notwithstanding its many conveniences, for baking beans, it, like the Buzzacott, does not retain the heat well enough; for this purpose the Dutch oven is still the old reliable for the field.

Bread is an article of the ration we seldom have to pay much attention to in garrison. Sometimes too much is drawn and a quantity becomes stale; if such is the case dip the whole loaves in water till soaked, then put them in the oven until heated through when they will come out fresh again.

Tea as a component of the ration I first made extensive use of last summer. I found iced tea for a summer drink for dinners quite as popular as lemonade and that it could be furnished for one-fifth of the cost of lemonade. Iron discolors. Make tea in bright tin or earthenware. Make Chinamen's tea, not white

man's tea. The former is infused, is light in color and delicate to the taste; the latter is steeped, is strong and black and bitter. Why tea has been so little used as a part of the ration and coffee has become the standard three times a day is owing largely, I think, to the vile decoction that comes from *boiling* tea leaves, while coffee is bearable in spite of such abominable treatment.

In cooking salt meats we have chiefly to deal with bacon and pork; frying or baking with beans gives good results even with inexperienced cooks, but in case a barrel of corned beef is bought and the cook is not used to it he is apt to treat it as he does fresh beef when boiling it, that is, he will put it in boiling water and a few minutes later reduce the temperature, the result is disastrous, a tough, unpalatable mass often impossible to swallow; instead, salt meats boiled, must be put into cold water, the temperature raised to about 160° F. and kept there for many hours, there is little danger of cooking too long. A most excellent piece of corned beef spoiled by fast and furious boiling taught me this lesson impressively.

In the field last fall while in charge of the officers' mess, my attention was called to the excellence of certain broiled steaks, but the standard was not uniform. I found that when the fire was clear and steaks were cooked *before* the fire the best possible results were obtained, that when steaks tasted smoky there were two explanations, one was mine to the cook that he had tried to hurry matters by holding his broiler over the fire instead of in front of it, that the drippings had caught fire and so smoked the steak; the other was the cook's explanation to me that the wind blew and he couldn't keep the fire clear. We agreed on this that the fire must be clear or the steak would taste smoky.

In regard to frying I have absorbed some of "our" Lieutenant Elliot's ideas and following the advice of *Punch* in another matter, would say "Don't." This prohibition has particular force when it comes to pastry. It is not that food can not be fried properly, but because the average cook in the army or out of it does not, and I might almost say, will not appreciate the difference between frying in a wholesome way and in an unwholesome way. As a boy I very much liked doughnuts that seemed fat inside, or as I was told, they had "soaked fat." But though

with boyish slang I boasted of having a cast-iron stomach it did not take me many years to learn that I could not run up against those doughnuts with impunity. Later the reason was plain, the fat in which they were fried was not hot enough. Frying, unlike boiling and baking must be done quickly. When the fat is hot the outside is cooked so quickly that the fat does not penetrate, the food comes out light and with flavor unimpaired. The test for heat is to watch for the little puffs on the fat, then it is hot enough to give wholesome results.

There comes up the question of following receipts. The "Army Manual," valuable as it is, will be supplemented by interested cooks by receipts and receipt books of their own choosing. We have all heard of, perhaps known of, the wonderful dishes of the colored "Aunties"; no one but themselves knew their combinations, when asked how a certain dish was gotten up, it was a handful of this, a pinch of that and a little of the other, but common sense tells us that dishes uniformly good are made in a uniform way. I know from my experience with a mess that the cook who measures his ingredients as per the receipt, is far more successful and satisfactory than the one who acts on the principle that cooks are born, not made, and guesses at it. The former is careful, particular and economical, the latter is lazy, shiftless and extravagant.

The training of the cooks includes that of their helpers, the regular kitchen police whose work, preparing vegetables and the like, washing dishes and cooking utensils, it is necessary to carefully supervise.

The second cook, who is here considered directly responsible for wastage, and is being carefully trained as to neatness, becomes the logical man to direct their work and instruct them. In the care of baking pans, mess pans and the like I have learned two things of importance; one is, that to wash them with a rag often makes them worse instead of better, the other, that sunlight is a most valuable assistant. The pans are washed last, after the dishcloths are greasy from the dishes; the greasy dishcloths are considered clean enough for a black iron pot or pan, and while they may distribute the grease around equally so that it is not readily noticeable, they do not get it off. The bare hand is far better; in fact, to wash them

with the bare hand is *the* way. At first I did not notice anything out of the way with the dish rag system. The pans on the shelves looked clean till by chance I had one taken down to see if I could get any grease out of the corners with a pocket knife. I found that not only could I dig black grease out of the corners, but could scrape the same off the bottom as well. Correcting this, I followed with the second, viz., setting pans and tinware out in the sunlight to air and dry. A table outside the storm shed of the kitchen door makes this convenient. The bright sunlight promptly makes evident any neglect on the part of the kitchen police, and is in itself, as noted above, an important factor in keeping them sweet and clean. Slackness on the part of the kitchen police to be invariably followed by an extra detail of the same proves the old adage good, that the certainty of punishment rather than the severity of the same is the best deterrent.

There should be no retrograde movement in the quality of the mess. I refer to the ordinary conditions of garrison life. I think it is a well established fact that our soldiers in the field in time of active service will stand anything that can reasonably be expected of mankind. This is the record of the past. The argument sometimes put forth that exchange profits, large company funds and improved quality of messes is coddling our men so that when the deprivations of the field come they will be discontented and worthless, is, I believe, an entirely needless fear. To live bountifully and well when we can, at the same time having plenty of bodily exercise, is to build up a reserve of health and strength in the individual soldier that he can draw upon like a bank account in time of need, and still leave his constitution unimpaired.

Our ration is often referred to as the best army ration in the world. It ought to be. The American people at large are the best fed people in the world. The recruits we get have as a rule been used to good living, and a mess falling below the standard to which they have been accustomed is promptly a source of discontent, and has undoubtedly been a prolific source of desertion. We cannot, on the other hand, speak too confidently of the generous proportions of our ration. Comparing it with others included in Professor Atwater's tables, expressed in

units of potential energy, our army ration is only eighty per cent. of the navy ration, forty-five per cent. of that of the bricklayers of Boston, Mass., fifty per cent. of that of the teamsters of Boston, and seventy-five per cent. of that of the college football teams.

Compared with the German army ration it is more than theirs on a peace footing or war footing but less than their extraordinary ration in the Franco-German War. Our meat ration is often quoted as "so liberal," one writer refers to it as the source of the "git up and git" of the American soldier, but of the 20 ounces per day, 20 per cent. is bone, 25 per cent. wastes in the cooking leaving but 12 ounces per day net, a difference between the apparent and real ration showing plainly the necessity of getting what we can out of the nutricious bones and of preventing any other wastage.

Lieut. C. J. T. Clarke, U. S. A., in an essay published in the JOURNAL of M. S. I., May, 1894, comparing post and company messes advocated enlisting trained cooks at increased pay. I do not believe this at all necessary, but do believe that the disadvantages would outweigh the advantages.

I realize fully the relief it is to the company commander to have a competent cook who is willing to put in his whole enlistment in the kitchen but to adopt such a comfortable arrangement is not necessarily bettering the quality of the cooking, and as before stated would be at the expense of efficiency in case the company had to break up into detachments. A *chef* to handle the army ration would be out of keeping with the raw material provided, and the ordinary lumberman's or other laborer's cook worth in civil life perhaps forty dollars per month would be the standard of cooks we would get under Lieutenant Clarke's plan ; these are no better, in many cases not as good, as our cooks average. The present system is a good one ; it is simply for the company commanders to make the most of it and the best of it.

The burden of my story in the training of cooks, is to cook slowly. Box up, retain your heat, then use it as you want it without wastage. Incidentally while getting better food you save much fuel.

My first experiment in cooking slowly was made in 1889 at the request of the late Doctor Basil Norris of the army. This

was done by the direct rays of the sun on the parade ground at Fort Mojave, Ariz. I cooked in a way at about 140° F. but did not box up and retain heat in those experiments, for the necessity of economizing heat was not apparent in Fort Mojave. The advantage of retained heat is shown by the brick ovens in our post bakeries. Burnt bread is a thing almost unkown there. These brick ovens were the institutions of our grandfathers' houses and, cumbersome as they were, roasts of beef, of pork or of turkey that came out of them had their juices retained, the meats so tender, the flavors so delicious that the baking and basting of the modern iron range can seldom compare favorably with them.

The work involved with the ranges is greater too. Worry and constant attention and the risk of too much heat is ever present.

Mr. Edward Atkinson with his Aladdin oven seems in a small way, to have brought this retention of heat to perfection. His sheet iron box, asbestos lined, retaining the heat of a kerosene lamp, has solved the problem for family cooking and made the learning how to cook simplicity itself. The over-worked housewives of New England, and judging from reports, some from the Dakotas as well, are learning to rise up and call him blessed.

In his "Science of Nutrition" Mr. Atkinson shows that one billion of dollars is annually wasted on food in these United States, and that chiefly through ignorance of what to buy and how to cook what they do buy, by those who can least afford it. In case the army is composed of an average of our people, and I think that a safe assumption, the men of the army left to their own device, and admitting the honest purpose of doing the best with their rations that they know how, would waste $357,142 worth of food per year, $14.28 per man. If this degree of waste does not exist in the army it is because company messes have the constant, careful and intelligent supervision of company commanders.

In forecasting a future when knowledge of how to cook shall provide "good subsistence, comfortable shelter and adequate clothing to him or to her who possesses health and intelligence, and this to such a degree that it won't pay to be rich," the writer quoted above admits the possibility of his being in a realm of

fancy, but dogmatically gives this as one of his facts, viz.: "Any intelligent boy can be taught in one lesson of one hour how to get up a five-course dinner for ten persons, consisting of soup, fish, roast, entrée, vegetables and pudding. I state this because I have done it."

The experiment stations so liberally supported by the U. S. Government have for years been elaborating on the diets of cows, horses, pigs and sheep, and now finally, with their finely equipped laboratories, they, with other scientific laboratories the world over, are devoting themselves to the "Science of Nutrition" as pertains to man, and to the art of applying heat under control to making our food palatable to our tastes and healthful to our bodies. With our army ranges we have to apply heat of which we have comparatively little control. It is a case now of making the best of what we have, with the right of hoping to get better. In touching upon this subject of cooks and cooking, I have had in mind full well the exceptionally good company messes at this post, also the fact that company commanders of long experience and careful observation, assisted by the liberal incomes from "The Exchange," are responsible therefor. This article has not been written in the spirit of a teacher, but rather as a consolidated record, to which I wish to add a belief that a fixed amount, set apart from the company fund on the first day of the month, is the correct and only correct basis to work upon. We know what our incomes will be, set the expenditure accordingly. Be it fifty cents a day, or one, two, three dollars a day, or a lump sum by the month, it should be kept in mind and rigidly adhered to.

To give the cook *carte blanche* is to invite financial disaster to the company fund, and make it uncertain whether monthly bills will be twenty-five dollars or one hundred and twenty-five dollars, and throws temptation in the cook's way that may prove his downfall.

Reprints and Translations.

RELATIVE EFFICIENCY OF INFANTRY AND ARTILLERY FIRE.—GERMAN OPINIONS AS TO THEIR THEORETICAL VALUE.

(*Translated from the Revue d'Artillerie.*)

By Lieut. W. E. RAFFERTY 1st U. S. Artillery.

BY an order of January 27, 1895, the Emperor William decided that he would each year present a special prize to the various units, companies, squadrons, or batteries, which should execute the best service firing.

Knowing the interest and care with which firing instruction is conducted in Germany, as well as the emulation which exists between corps in regard to everything pertaining to military instruction, such an order is not surprising. However, regarding the matter more closely, we must inquire whether its application will not meet with certain difficulties. The Emperor has really established an actual competition between the units of his army; but in order that this competition shall be equitable, it is evidently necessary that they who shall take part in it shall be judged by the same jury, operating under fixed rules known to all.

Now, where shall we find these rules? For the present they are unwritten. Is it possible to formulate them in such a manner that the estimation of service firing, whatever it may be, may not be abandoned to the arbitrariness or fancy of even the most impartial judges? Such are the questions which must be answered before knowing whether the intentions of the German Emperor can be executed.

Presented under another form, the problem may be stated as follows: Is it possible to determine mean results for service firing which will serve as a basis of comparison for any fire whatever?

General Rohne, whose numerous and important works are well known to the readers of the *Revue*, has sought to give a solution to this problem in a brochure, which appeared in 1895 as a supplement to the *Militär-Wochenblatt*, and later, in 1896, as a separate publication. In this pamphlet the author, starting from certain known results, endeavors to determine by calculation the mean effect to be gained in general from infantry and artillery fire when these are correctly executed. The figures which he deduces may, according to him, serve as a basis of estimation by the judges, who will be called upon to award the firing prizes instituted by the Emperor; not that these figures are sufficient in themselves for basing a definite judgment, but that they are indispensable for reference, if one wishes to avoid grave errors.

These ideas have not failed to arouse opponents. Certain officers have

reproached the General with wishing to give too mathematical a basis to the estimation of the effects of fire. According to them the circumstances which influence the results are so numerous that it is impossible to take account of them in calculation, and one only exposes oneself to errors by basing a judgment on figures, so called normal or mean, because in reality such numbers do not exist. The rain, the wind, the sun, the degree of fatigue of troops, the nature of the soil about the target, and many other factors intervene to diminish the efficacy of fire, so much so that a troop may often fire very correctly, although it may have obtained only very small percentages on the targets.

These objections are not new ; they have been advanced many times already in Germany, as well as elsewhere, but they are always unavailing, because whatever the adversaries of home-made calculations may say, it is none the less true that these are found to be a powerful aid in forming a sound appreciation of the results furnished by practice. It has therefore not seemed to us useless to point out how one of the most competent German officers views the solution of problems relating to service firing.

In his pamphlet, General Rohne takes up first the subject of infantry fire, then artillery fire, and concludes with a comparison between the two arms. We shall adopt this division in our study.

I.—EFFECT OF INFANTRY FIRE.

In order to show clearly what should be the point of view, and to point directly to the kind of errors which must be avoided in questions of fire, the author gives certain examples, among which we find the two following :

1. Two companies fire the same number of bullets at the same range against two lines of skirmishers, lying down, occupying the same front. The first line numbers sixty files, the second thirty. The two lines receive each fifty bullets, which result in thirty-three files wounded (or fifty-five per cent.) in the first, and twenty-four (that is, eighty per cent.) in the second. Although the two companies may have put the same number of bullets into the target with the same number of shots fired, nevertheless that one which has put eighty per cent. of the files *hors de combat* has done better firing than the other.

2. Two detachments, one of eighty and the other of one hundred and twenty men, in a period of six minutes, fire each twenty-four hundred cartridges, and each obtains sixty hits. The respective targets represent the same number of skirmishers as the detachments. The detachment of eighty men has put forty-two files *hors de combat*, that of one hundred and twenty men, forty-eight files. Although the per cent. of hits is the same (2½), and although the stronger detachment has put more files *hors de combat* than the other, nevertheless it is the latter which has done the best firing, because in the same time it has put proportionally more bullets into the target.

Results of fire, therefore, must not be judged without very careful examination. To form an accurate and reasonable opinion in regard to them, it is necessary to know: First, the probable percentage of hits which can be obtained under given circumstances; second, the relation which exists between the total number of hits, that is to say, the number of bullets which reach the targets, and the number of files wounded when the fire is uniformly delivered over the whole length of the target; third, the maximum rapidity of fire which can be obtained without diminishing the accuracy.

We shall see how these different factors of efficiency, or rather of useful effect, can be calculated.

PROBABLE PERCENTAGE OF HITS.

The percentage of hits which can be obtained, depends in the first place on the accuracy of the gun and the dimensions of the objective, but it depends also on the skill of the men, on their physical and moral condition and the error of the sight.

The theoretical accuracy of the arm, indicated for the rifle by the probable vertical deviation given in the table of fire, influences but very little its real practical accuracy. This is about the same for all arms actually in service. The real accuracy of service firing is immeasurably less. This fact results from the considerable errors due to individuals. These errors are smaller for skilled soldiers than for unskilled, but they never entirely disappear.

Different Kinds of Fire.—Infantry fire is of two very distinct classes, both of which have their partisans and their opponents: fire at will (independent fire) and fire by command. In Germany the independent fire, called the skirmish firing (Schutzenfeuer) is the most generally employed. In France, on the contrary, we make large use of fire by command, or as it might better be called, salvo firing. Here evidently is a divergence of views which proves that ideas are not yet thoroughly in accord on this point.

We are not prepared to decide in favor of one or the other; which is not, moreover, the aim of this paper. We will limit ourselves to indicating briefly the arguments which are made in favor of both systems so as to bring out the ideas of the Germans in this line.

If we consult the regulations on fire instruction, of 22d May, 1895, we will see that in France the different fire methods provided for infantry, are: first, individual fire; second, collective fire; third, rapid fire; fourth, magazine fire.

These firings define themselves without further explanation. Still, it must be noted that the term collective fire is not very explicit, for a fire of this kind may be executed equally well at will or by command. In practice collective fire will be almost always executed in France by command and by salvos.

Our regulations justify the use of salvo firing by the following :—

"Salvo firing serves to maintain the ascendency of the chiefs over their command, facilitating the concentration of fire on one objective, permitting the correction of fire by observing the points of fall, and giving the means for regulating the expenditure of ammunition. * * *

"Independent firing is more difficult to correct than salvo firing and lends itself less to concentration of fire and to fire discipline. * * *

"Independent firing is practical at short distances and when the troops, exposed to a very hot fire, no longer possess the coolness necessary to a good execution of salvo firing."

On their side, the Germans condemn salvo firing for restraining the independence and weakening the individual initiative of the men. Moreover, they believe that salvos cannot be executed on the field of battle in the midst of the noise and on account of the extended order and the irregularity of the fighting line.

"Firing by command," says Lieutenant-Colonel von Lichtenstein, commanding the Bavarian Military School of Fire, "is in direct opposition to the development of individual initiative which forms the very essence of our fire instruction.

"At long ranges when salvo firing is still possible, the French hope that the points of fall of the bullets, in front and in rear of the target, will be sufficiently visible to permit changing the sight, but this will rarely occur in practice. Besides, when it does occur, individual fire will just as well permit the desired correction.

"We are also led to believe that during a battle salvos are of advantage to bring back a troop to the hand of its chief. Now, if men have gotten beyond control of their officers at a time when it is still possible for the latter to command the fire, as when the enemy is far off or his fire is ineffective, how will the situation be improved when we approach our adversary?"

Normal fire in Germany is therefore individual fire; salvo fire (Salvenfeuer) and rapid fire (Schnellfeuer) are only exceptional.

It is therefore not astonishing that General Rohne in his brochure, devotes himself exclusively to individual fire. We will endeavor to be less exclusive, for it seems to us that the study of salvo firing and even of rapid firing are not without interest, the more so as certain officers go so far as to claim that the last is the proper fire for the field of battle.*

Value of the Probable Error.—But whichever kind of fire we take, the first thing to determine is its accuracy measured by the probable vertical deviation. This error is quite difficult to determine; it can be reached only after long and profound study of the question. In general, military publications are very silent on this point, either because conclusive experiments have not been made or because no one is anxious to make known a result considered as inopportune to divulge.

In the first edition of his brochure, General Rohne had chosen as the

* On this subject the reader may with profit consult articles published by Colonel Lafitte-Rouzet, in the *Journal des Sciences Militaires*, September and October, 1876.

basis of his calculation, the errors deduced in the works of the Swiss Colonel Siegfried. These errors are the following:

Ranges.	Probable vertical deviation.
Metres.	cm.
100	19
300	62
500	109
1000	250
1500	449

Since that time these numbers have appeared to him too large, and in the second edition of his pamphlet the General has given others much smaller, so small indeed that they appear to relate to sharpshooters. These are the errors which he has used in his calculation and which he has reproduced after completion of the last work which he has just published and which is entitled: "Course of Firing for Infantry Officers." We give them below.

Ranges.	Probable vertical deviation.	Ranges.	Probable vertical deviation.
m.	cm.	m.	cm.
300	23	1200	190
400	32.5	1300	230
500	42	1400	270
600	52	1500	320
700	64	1600	375
800	80	1700	430
900	100	1800	500
1000	125	1900	685
1100	155	2000	700

These errors we repeat, seem too small to us for the fire of ordinary troops, especially at distances below 800 metres. In application it appears to us preferable to adopt the errors given by Colonel Lafitte-Rouzet in the August number, 1896, of the *Journal des Sciences Militaires*. This officer adopts the rule that up to 1200 metres the probable errors of infantry fire of any kind will be proportional to the range. This is a very simple and easy law to remember. If it is not absolutely accurate it is sufficiently so for all practical purposes. If, moreover, we examine the results of experiments made with the rifle model 1886, at Châlons, it is evident that the firings may be classed according to accuracy in the following manner:

First, individual fire; second, collective fire; third, rapid fire.

We pass over certain other kinds of fire, of which our Regulations make no mention.

At a hundred metres the probable vertical deviation of rapid fire may be considered as equal to 50 cm., of collective fire 25 cm., and of individual fire 12½ cm. These very simple figures serve as a basis for the

determination of the probable error at any distance whatever. To obtain this it is sufficient to multiply the error at 100 m. by the number of hundreds of metres in the distance. Thus at 700 m. the probable error in height of collective fire will be $7 \times 25 = 175$ cm.

The errors in direction follow the same law and are equal to the errors in height up to 1200 m.

Starting with 1200 m. the vertical error increases more rapidly than the distance while the horizontal error always follow the law of proportionality to the distance. Colonel Lafitte-Rouzet gives the following figures:

COLLECTIVE FIRE.

Ranges.	Probable vertical deviation.
m.	cm.
1300	337
1400	375
1500	425
1600	475
1700	550
1800	625
1900	750
2000	935

The errors of rapid fire are double the preceding.

Vulnerable Surface of Different Elements Which Compose the Objectives.—Now that we know these errors we can go a little further and calculate the per cent. of probable hits on a given target. To make this calculation we must determine first the vulnerable surface of the different targets which are most frequently met with on the field of battle. It is easy to obtain the vulnerable surface of an objective when that of the composing elements of the surface is known. The first thing to be done is to measure the vulnerable surface of a foot soldier, and of a mounted horseman in the different positions which they may occupy on a line of battle. This measurement has been made several times already; we will take the figures given by General Langlois in his book on "Artillery In Combination With Other Arms," and which are deduced from Italian experiments. These figures are the following:

Vulnerable surface of the different elements composing the objectives on the field of battle.

Foot soldier, front face, standing	.48 m²
" side face, standing	.28 m²
" kneeling	.32 m²
" lying down	.16 m²
Horse, front face	.84 m²
" side face	1.59 m²
Mounted horseman, front face	1.13 m²
" " side face	1.80 m²

We will take the following values for the height of these different elements:

Foot soldier, standing	1.60 m
" " kneeling	1.00 m
" " lying down	.55 m
Mounted horseman	2.50 m
Horse	2.00 m

It is now easy to calculate the percentages of hits on any formation whatever.

We can not consider here all the various targets which will be met with on the field of battle, that would cover too much ground; we will limit ourselves to study the effect of fire on lines of skirmishers standing, kneeling or lying down, on cavalry deployed in one rank, or on artillery in battery. Those of our readers who desire, in addition, to take account of the vulnerability of objectives other than those mentioned, can do so without difficulty in a manner similar to that which we are about to indicate. We will take up infantry and cavalry, returning to artillery later on.

FIRE OF INFANTRY AGAINST INFANTRY AND CAVALRY.

Let us suppose first that the fire is directed against continuous panels of any length whatever and having, respectively, as heights, the height of a foot soldier standing, kneeling, or lying down, or that of a mounted horseman. Let us suppose furthermore that the fire is uniformly delivered, that is to say, that the density of the sheaf is uniform with regard to its breadth. The calculation of probabilities gives us then the percentage of probable hits at the different ranges.

TABLE I.

Percentage of Hits on Different Objectives of Infantry and Cavalry, ricochets not included.

The centre of impact is supposed to coincide with the centre of figure.

Ranges.	HEIGHT OF THE PANELS.			
	1.60 m. Infantry standing.	1.00 m. Infantry kneeling.	.55 m. Infantry lying down.	2.50 m. Cavalry.
	1st. Individual Fire.			
m.				
300	89.4	63.1	37.9	97.5
400	71.9	50.0	28.9	90.8
500	61.2	41.0	23.3	82.3
600	52.2	34.7	19.5	73.9
700	46.1	29.9	16.8	66.5
800	41.0	26.4	14.7	60.0

2d. Collective Fire.

300	52.2	34.7	19.5	73.9
400	41.0	26.4	14.7	60.1
500	33.4	21.3	11.8	50.0
600	28.0	17.8	10.0	47.6
700	24.2	15.3	8.5	37.0
800	21.3	13.4	7.4	32.6
900	19.0	11.9	6.6	29.1
1000	17.1	10.7	5.9	26.4
1100	15.5	9.8	5.4	25.8
1200	14.3	9.0	5.0	22.1
1300	12.7	8.1	4.5	19.7
1400	11.4	7.2	3.9	17.8
1500	10.1	6.3	3.5	15.8
1600	9.0	5.6	3.1	14.1
1700	7.9	4.9	2.7	12.1
1800	7.0	4.3	2.3	10.7
1900	5.7	3.6	2.0	9.0
2000	4.7	2.9	1.6	8.3

3d. Rapid Fire.

100	71.9			90.8
200	41.0			60.1
300	28.0			47.6
400	21.3			32.6
500	17.1			26.4
600	14.3			22.1
700	12.3			19.1
800	10.7			16.7

Ricochets.—The preceding table gives only direct hits. To come nearer to the reality we must take into account ricochets. The estimation of the number of hits to the ricochets is quite difficult, because this number depends essentially on the nature of ground on which the bullets fall. In general, ordinary ground, on account of its inequalities is not favorable to ricochets, and we believe therefore that we would cause errors in considering ricochets as numerous on varied ground as on the target range. General Rohne adopts in his calculations a mean value which he uses for all ranges and all grounds. According to him the ricochets increase the number of hits 30 per cent., whatever the ground or distance, that is to say, that in 130 hits there would always be 39 due to ricochets. The General does not give his reasons for taking this figure and in fact it appears to us too large.

According to experiments made in France the influence of ricochets would be far less. General Le Joindre published in the September number, 1896, of the *Journal des Sciences Militaires*, a very instructive study on this subject. Starting from experiments made in the camp at Châlons by Commandant Journée with the French small arm, General Le Joindre has constructed tables which enable us to calculate the percentage of hits

due to ricochets for different sheafs. These tables are based upon a very reasonable method ; we will say one thing against them, however, that when it is desired to represent them graphically, curves are produced which do not present sufficient continuity. The result of this is that interpolation is difficult. However it is easy to remedy this defect by modifying slightly the figures given by the General. The following numbers are so modified, and have served us for calculating the percentage of hits due to ricochets. The results of this calculation are given in the table appended, which apply as well to individual as to collective fire, or to rapid fire, for as General Le Joindre remarks, the effect of ricochets is almost independent of the probable error.

TABLE II.

Per cent. of Hits Due to Ricochets.

Ranges.	Panel of 1.60 m.	Panel of 1.00 m.	Panel of .55 m.	Panel of 2.50 m.
m.				
300	1.5	1.6	1.5	0.3
400	1.9	2.1	1.5	1.0
500	2.5	2.5	1.7	1.8
600	3.0	2.6	1.7	2.7
700	3.3	3.0	1.7	3.4
800	3.9	2.2	1.5	2.5
1000	3.1	1.7	1.2	2.1
1200	2.4	1.4	0.9	1.7
1400	1.4	1.0	0.6	1.6
1600	1.1	0.8	0.2	1.6
1800	0.7	0.4	0.1	1.0
2000	0.3	0.2	0.1	0.5

By adding the figures of Table II to those of Table I, we obtain the total number of hits including ricochets.

TABLE III.

Per cent. of Hits on Different Objectives of Infantry and Cavalry, Including Ricochets.

Ranges.	1.60 m.	Height of the Panels.		2.50 m.
		1 00 m.	.55 m.	
	First Individual Fire.			
300	90.9	64.7	39.4	97.8
400	73.8	52.1	30.4	91.8
500	63.7	43.5	25.0	84.1
600	55.2	37.3	21.2	76.6
700	49.4	32.9	18.5	69.9
800	44.1	26.6	16.2	62.6

Second Collective Fire.

300	53.7	39.3	21.0	74.2
400	42.9	28.5	16.2	61.1
500	35.9	23.8	13.5	51.8
600	31.0	20.4	11.7	51.0
700	27.5	18.3	10.2	40.4
800	24.4	15.6	8.9	35.1
900	22.1	14.5	8.2	32.0
1000	20.1	12.4	7.1	28.6
1100	18.3	11.5	6.4	27.7
1200	16.7	10.6	5.9	23.8
1300	14.7	9.4	5.3	21.0
1400	12.8	8.2	4.5	19.4
1500	11.3	7.2	3.9	17.4
1600	10.1	6.4	3.3	15.7
1700	8.8	5.5	2.9	13.4
1800	7.7	4.7	2.4	11.7
1900	6.2	3.9	2.1	9.7
2000	5.0	3.1	1.7	8.8

Third Rapid Fire.

100	71.9			90.8
200	41.0			60.1
300	29.5			47.9
400	23.2			33.8
500	19.6			28.2
600	17.3			24.8
700	15.6			22.5
800	13.8			19.1

Discontinuity of the Target.—This table will aid us now in calculating the per cent. of hits on real targets, that is to say, disconnected targets. Let us suppose, for example, that there is a line of skirmishers standing 1 m. from centre to centre. It is clear that on the front to the running metre there would be only .48 m. of vulnerable surface instead of 1.60 m. as there would have been if the target was absolutely continuous. The line of skirmishers will receive then only 48/160=3/10 of the hits given in Table III.

In general, if M is the vulnerable surface of a file, L the length of front occupied by him, and S the surface of the supposed continuous target to the running metre of front, the coefficient of reduction to be employed in passing from the continuous to the discontinuous target will be M/LS. By supposing the files placed at 1 m. from centre to centre. the following numbers are obtained, L being equal to 1.

Sight Errors.—In what precedes we have considered that the elevation suitable to the distance of the objective is exactly known, but this will hardly ever occur in war. On the field of battle a soldier will fire almost always with an elevation differing more or less from the exact elevation and the number of hits which the objective will receive will therefore be sensibly reduced. The French regulations consider that the

TABLE IV.

Per cent. of Hits Against Different Targets.

Ranges.	Infantry Standing.	Infantry Kneeling.	Infantry Lying Down.	Cavalry.
	1. Individual Fire.			
300	27.3	20.7	11.3	44.1
400	22.1	16.7	8.7	44.1
500	19.1	13.9	7.3	38.1
600	16.6	11.9	6.1	35.2
700	14.8	10.6	5.4	31.6
800	13.2	8.5	4.7	28.3
	2. Collective Fire.			
300	16.1	12.6	6.1	35.5
400	12.7	9.1	4.7	27.6
500	10.8	7.6	3.9	23.4
600	9.3	6.5	3.4	23.1
700	8.2	5.8	3.0	18.3
800	7.3	5.0	2.6	15.9
900	6.6	4.6	2.4	14.5
1000	6.0	3.9	2.1	12.8
1100	5.5	3.7	1.9	12.5
1200	5.0	3.4	1.7	10.8
1300	4.4	3.0	1.5	9.5
1400	3.8	2.6	1.3	8.8
1500	3.4	2.3	1.1	7.9
1600	3.0	2.1	1.0	7.1
1700	2.6	1.8	0.8	6.1
1800	2.3	1.5	0.7	5.3
1900	1.9	1.2	0.6	4.4
2000	1.5	1.0	0.5	4.0
	3. Rapid Fire.			
100	21.6			41.0
200	12.3			37.5
300	8.8			21.6
400	6.9			15.3
500	5.9			12.7
600	5.2			11.2
700	4.7			10.3
800	4.1			8.6

sight may be set at 400 m. for firing up to 600 m. against infantry standing or in motion. Against cavalry the sight at 600 m. is considered satisfactory for all distances below 800 m. Let us see how these directions will influence the results of fire.

The position which the mean trajectory occupies with respect to the objective is easy to determine. Let us suppose for example that we fire

with the sight at 400 m. against a line of skirmishers standing of a density equal to 1 and distant 300 m. taking as a point of sight the centre of the target, which enables us to consider the line of sight sensibly horizontal. The table of ordinates of the trajectory of the bullet of small arms model 1886, shows that at 300 m. a trajectory of 400 has an ordinate of .66 m., that is to say, it passes .66 m. above the centre of the objective. Since, moreover, we have admitted that the errors in height are proportional to the ranges, the probable error corresponding to the range of 300 m. will be 37.5 cm. (individual firing); we have then all the elements necessary to solve the problem. By making a similar calculation for ranges of 300, 500, and 600 m., we will reach the following results.

TABLE V.

Per cent. of bullets which will be received by a line of skirmishers standing, of a density of one man to a metre, and firing with the sight at 400 m., including ricochets.

Ranges.	Individual fire.	Collective fire.	Rapid fire.
300	17.8	14.0	9.0
300	22.1	12.7	6.9
500	11.8	10.5	6.3
600	4.0	5.5	5.0

We can make the same calculation for the fire when the sight is at 600 m. against a line of cavalry.

TABLE VI.

Per cent. of bullets which will be received by a line of cavalry of a density of one man per metre in firing with the sight at 600 m., including ricochets.

Ranges.	Collective fire.	Rapid fire.
300	7.2	13.1
400	11.7	12.7
500	17.3	12.7
600	23.1	11.2
700	18.7	9.3
800	8.0	5.9

We see that the figures are sufficiently large to make one hope for a serious and rapid effect.

Estimation of Distances.—In his course of firing for infantry officers, General Rohne devotes a special chapter to the estimation of distances and points out the influence of an error of sight on the efficacy of fire. On account of the flatness of their trajectory, modern arms have a very extended danger zone at short ranges, which permits them to produce forcible effects even when the elevation employed differs materi-

ally from the correct elevation. Nevertheless, it is desirable to use the correct elevation for the range, since this produces always the greatest effect. But since the points of fall of the shots are generally difficult to observe even at mean distances, however favorable the ground may be, it will often be necessary to abandon sight corrections by the observation of the points of fall, or at least this correction will require a very long time. From this fact has sprung the idea of overcoming the difficulty by using sights in echelon. But this proceeding is only a palliative and it will always be necessary to know the range of the target as exactly as possible in order to diminish the number of "steps" in echelon. Practice in estimating distances need not be neglected, but on the contrary should be enforced so as to form the greatest possible number of men skilled in this kind of operations.

On principle, the Germans do not use telemetres. They estimate distances by the eye, or by means of a map; these two methods present numerous opportunities for error, which practice may diminish but cannot wholly obliterate.

By utilizing the work of his predecessors, supplemented by his personal investigation, General Rohne arrives at the conclusion that the probable error in range, when estimated by the eye, reaches 1-7 or 1-8 of the range. If every skirmisher is given freedom to estimate the range according to his own way, there would result a new cause of error in firing which will combine with the others according to a known law; the resulting error will be equal to the square root of the sum of the squares of the component errors. Thus at 1000 m. the probable error in estimating the range will be 125 m. The tangent of the angle of fall of the bullet being about .04906, the error of 125 will correspond to an error in height of 6.13 m. On the other hand, the error in height of collective fire at 1000 m. is about 2.50 m., one will therefore have as the resulting error: $Ex = \sqrt{6.13^2 + 2.50^2} = 6.62$, it is seen that the error made in estimating the range has a preponderating influence.

At long ranges and even at mean ranges the chiefs of all grades should make their action felt in an efficacious manner; they can indicate to their subordinates the elevation to be given; if they make an error, this error influences the whole fire, the centre of impact of which will then be more or less distant from the objective. But at short ranges, at the moment when, as our regulation states, it is no longer possible to fire by command, each skirmisher will be left to himself and will act on his own responsibility; it is important then that he should know how to estimate distances with such accuracy as to avoid very large errors.

This necessity is of great importance in the eyes of the Germans on account of their preference for individual fire. It is not astonishing then to see General Rohne, and with him many other officers, asking that the enlisted men shall receive very advanced instruction on estimating distances by the eye.

"In my opinion," says a German general, "we can increase very

much the instruction of the men in this regard. It is, I acknowledge, very rational to begin by having them estimate short distances, but we must not stop there too long. We must on the contrary proceed rapidly to distances beyond 300 m. The difficulties which are met in estimating large distances over varied ground diminish very much by the use of the telemetre. It cannot be difficult to find an instrument to be used for practice in time of peace which will give every distance between 300 and 1500 m. with rapidity and accuracy. The cost of such an instrument would be largely compensated for by the advantage which it would offer in the instruction of troops.

"What we have just said of the influence of an error in range applies solely to the case where the direction of fire is at fault, which will happen often in battle, at least at short distances. We cannot hope that below 400 m. the sight can be indicated with certainty; at longer ranges the control of fire is better assured and it is possible to make men take the same elevation."

Men to Point Out the Objective.—It is precisely for facilitating this control of fire, already complicated in itself on account of the extension of the actual lines of battle, that the German regulations prescribe detailing with chiefs of section two or three skilled men charged with estimating the range of objectives and pointing them out to chiefs of section.

This regulation is limited to the expression of a principle without elaborating details for the employment of the men who point out the objective (objective indicators). Each officer interested is allowed freedom on this point. We must search among military publications for the details which are lacking in the regulations. In them we find what Captain Lambert and Bossert of the German infantry say in their work entitled, "Guide to Instructions for Non-Commissioned Officers and Enlisted Men in Battle Fire."

According to these two officers the duty of the objective indicators would consist; first, in estimating ranges; second, in watching the enemy's movements; third, in estimating the effects of fire; fourth, in warning the chiefs of section of movements of neighboring troops; fifth, in notifying them of the arrival of reinforcements; sixth, in transmitting to chiefs of section the orders of the company commander.

For greater simplicity it is desirable to assign to each indicator the duty which he will have to execute. This sub-division can be made, for example, in the following manner:

No. 1 indicator will have as his functions:

a. The estimation of the minimum distance at which the objective can be found.

b. Overlooking the ground in front.

c. Watching the movements of the enemy.

d. Observing the effects of fire.

The functions of No. 2 will comprise:

a. The estimation of the maximum distance at which the objective is found.

b. Watching the flank so as to discover in time the appearance of a new adversary.

c. Giving warning of the movements executed by neighboring troops as well as the arrival of reinforcements.

If there is a third indicator, his function will be:

a. To take the mean of the observations of the other two.

b. To watch the movements of units placed behind the line of battle.

These two officers even go so far as to require that the indicators shall be capable of indicating not only whether a fire is short or over, but also how much. This last requirement seems to us too great. If the indicators are well instructed and methodically employed they will certainly render excellent services, but they cannot estimate how much fire is short or over. The points of fall of the bullets are difficult to see; as to knowing if these points of fall are 50 m. or 100 m. from the targets the thing is to our mind impossible in a majority of cases.

The Germans are not the only ones to make use of objective indicators; the Italians likewise do so. They have gone even further in this line, for with them the indicators are designated in advance as the result of a competition, and they are practiced in measuring distances with the eye up to 2000 m.

Sights in Echelon.—However, we know that the fire regulations have done wisely in prescribing the use of sights in echelon as soon as there is any uncertainty about the distance, which happens almost always when the distance is rather great. The German regulations fix 800 m. as the inferior limit, beyond which the echeloning of sights is imposed. This echeloning is done on two sights differing about 100 m. and embracing the estimated distance.

In France 1000 m. is what our regulation fixes as the inferior limit for the use of sights in echelon, but at the same time it is laid down that the echelon step shall be 200 m.

In general, the echelon step should bear a relation to the probable error of ⅛ the range, which seems to be admitted in estimating by the eye.

Let us suppose that we have estimated the distance of the objective at 1200 m. The probable error being 150 m., the target may be found at four probable ranges in front or beyond the estimated distance; that is, between 600 m. and 1800 m. It is evidently not with two sights differing by 100 m. that we can hope to cover such an interval.

Let us take a case more favorable and suppose that account is taken only of cases where the target is not more than two probable errors from the estimated distance. It is known that the probability of its being so is 82-100; that is, as we see, very high. The target would then be embraced between 900 m. and 1500 m. The two sights of 1150 and 1250 will

still be insufficient to cover this interval. What we say here of the range at 1200 m. would be still more accurate of a greater distance.

On the contrary if we fire alternately with sights at 1100 and 1300, a very simple calculation shows that we would strike almost the entire ground comprised between 900 m. and 1500 m. In fact, at 1100 m. the probable error of fire (collective fire) is 2.75 which corresponds to an error in range of 47 m. The space covered by the sheaf will then be 8×47 m. $= 376$ m. in length, and will extend from 917 to 1288 m. At 1300 m. the probable error in height is 3.375, which gives 41 m. for the error in range. The space covered will then be $8 \times 41 =$ equal to 328 m. in distance, and will extend from 1136 to 1464 m. The two sights of 1100 and 1300 m. will be sufficient eighty-two times in a hundred. To be absolutely certain of always reaching the objective, it will be necessary to employ three sights, 1000, 1200 and 1400.

It can be seen that it will be too complicated to calculate the efficacy of fire in the case of sights in echelon, because the results depend on the position of the objective in relation to the centre of impact of the different sights. Now this position is naturally very variable. The calculations can easily be made for a determined position of the objective, but the results arrived at have value only for the one position considered.

Fire at Unknown Range. Skirmishers Estimating the Range Themselves.—A more simple case to study is that of firing at an unknown range, when the skirmishers themselves estimate the range and when the errors they make are added to the other causes of error for increasing the dispersion.

If we admit a probable error of $\frac{1}{8}$ in the estimation of the range, retaining, as the vertical error due to the individual, the value which we have given above for the case of individual fire, the law of combination of errors will give us as resultant errors the following values:

TABLE VII.

Probable Errors in Height of Individual Fire at Unknown Range.

Ranges. m.	Probable error in range.	Corresponding error in height.	Error in height of individual fire at known distance	Resulting error.
300	37.5	0.234	0.375	0.442
400	50.0	0.482	0.50	0.692
500	62.5	0.883	0.625	1.081
600	75.0	1.459	0.75	1.640
700	87.5	2.241	0.875	2.406
800	1.00	3.259	1.00	3.408

These errors enable us now to calculate the effect of fire on the different targets.

Fire with Sights in Echelon.—If one wishes to take account approximately of the effect produced when sights in echelon are operated according to our regulations, he should proceed in the following

TABLE VIII.

Individual Fire at Unknown Distance.—Percentage of Hits.

Ranges. m.	Infantry Standing.	Infantry Kneeling.	Infantry Lying Down.	Cavalry.
300	23.8	11.4	3.4	42.8
400	17.5	7.9	2.3	35.6
500	12.2	5.4	1.5	26.3
600	8.8	3.8	1.1	19.0
700	6.3	2.8	0.8	14.0
800	5.0	2.0	0.6	10.0

manner. We will suppose the position of the objective coincides successively with the centre of impact of the two sights employed; we will calculate the number of hits obtained with these sights and take the mean. Thus at the estimated distance of 1200 the sights are set at 1100 and 1300. For a total expenditure of 100 cartridges, fifty are fired with the sight at 1100 and fifty at 1300. From table IV, the fire at 1100 m. will give 2.75 hits, the fire at 1300 will give 2.2 hits. The mean is 2.5, which can be considered as representing the effect produced on the objective. It may be noted that this mean is practically equal to half the number of hits given by the sight at 1200 m., the mean of the two sights in echelon. Here therefore we have a simple and easy method for obtaining an approximate idea of the effects of fire.

FIRE OF INFANTRY AGAINST ARTILLERY.

Let us pass now to the artillery and see what will be the probable effect of infantry fire against a battery in regular formation for battle.

The calculation of the vulnerable surface is less simple in this case than for infantry on account of the very unequal distribution of men on the line of battle. By treating the question, however, mathematically, we obtain figures which agree very well with results of direct experiments.

If we take no account of men on horseback, the necessary personnel for the service of a battery in action is composed of forty-seven men, including officers, as follows:

1 Captain commanding.
3 Chiefs of platoon.
6 Chiefs of piece.
1 Chief artificer.
1 Farrier.
1 Trumpeter.
1 Signal man.
30 Cannoneers (5 to each piece).
3 Artificers (1 to a caisson).

Total 47

These forty-seven men do not remain stationary during the fire, they execute a series of movements which cause them to expose to the enemy a variable vulnerable surface. Sometimes they are front face and their vulnerable surface is then 48/100, sometimes they are side face, offering a surface of only 28/100. We think that we may take the mean of these two numbers and consider each man as having a vulnerable surface of 38/100, which gives for the whole battery $47 \times 38/100 = 17.86$, or 18 square meters in round numbers. This personnel is not disposed on the same line. The battery presents three principal lines, that of the pieces, the line of chiefs of section and the line of caissons, but these three lines are not far from each other and the same reasoning may be applied as if the whole personnel were distributed on the line of pieces.

The front of the battery is 75 m., including the space occupied by the captain on one of the flanks. By hypothesis then we admit a vulnerable surface of 18/75, or .24 m. per running metre of front.

To obtain the number of hits which the battery will receive it is sufficient then to multiply the figures of Table III by 24/160=.15. Thus we have the following numbers:

TABLE IX.

Per cent. of bullets which will be received by a battery served by forty-seven men.

	Collective Fire.		Rapid Fire.
Ranges.	Per cent. of Bullets.	Ranges	Per cent. of Bullets.
m.		m.	
800	3.7	500	2.95
900	3.3	600	2.6
1000	3.0	700	2.35
1100	2.75	800	2.1
1200	2.5		
1300	2.2		
1400	1.9		
1500	1.7		
1600	1.5		
1700	1.3		
1800	1.15		
1900	0.95		
2000	0.8		

For fire at unknown distance, we can obtain the approximate number of hits by proceeding as with infantry, that is to say, by taking half the preceding figures.

(*To be continued.*)

THE PERSONAL HYGIENE OF THE SOLDIER.

By Brigade-Surgeon Lieut.-Col. Wm. HILL-CLIMO, M.D.

(*From The United Service Magazine, London.*)

IT will be in the recollection of the readers of this magazine that in the article "The British Soldier in India and Enthetic Diseases," I attributed the liability to those diseases, as also the prevalence of enteric fever, to the ignorance of the laws of health, and to the moral conditions of the soldier consequent upon the low standard of education of the classes furnishing the majority of recruits, as compared with that of the general population. I urged that the Government was, if not legally, yet morally bound to protect its soldiers, and to save the nation from the baneful consequences of preventable disease by legislative action if all other means failed. I recommended that officers of the Army Medical Staff at depot centres, and in all large garrisons, should give lectures on the preservation of health, and on the prevention of disease; in other words, that the soldier should be instructed in personal hygiene, of which he is at the present time so lamentably ignorant. In the article, "Universal Service: Its Medical Aspects," I pointed out that one of the strongest reasons in favor of universal service was the educational effect it would have in dissipating this ignorance, and in raising the moral tone of the army by the presence of a large number of the higher and more educated classes in its ranks.

Without taking into account the effect of universal service, or of any other means which may be employed to improve the quality of the recruit, and leaving out of consideration any action of Government to check by legal measures the spread of preventable diseases—and among them I include not only enthetic but zymotic diseases generally—except in so far as it may be necessary to explain the position of the soldier's terms of service in connection with the arguments used by the opponents of any system of sanitary police, I propose in this article to deal with the soldier just as he is at the present time roughly hewn from nature's quarry, and to show what the Service can do for him, and what he can do for himself under the altered conditions of his life.

Every officer—executive and medical—engaged in recruiting must have had brought home to him the unfavorable conditions of the raw and ignorant youth on enlistment, and what a wide field the subject of this article presents. It is so vast that I shall only call attention to its more salient aspects, and from them draw such lessons as may help to determine the direction in which future sanitary efforts should be undertaken. In the article, "The Recruit and his Training," which appeared in the December, 1895, number of this magazine, I dwelt especially upon the training of the recruit, his food, his clothing and equip-

ment, in relation to his health. So far as possible I shall avoid going over old ground. I suggest, for the study of the question as a whole, that both these articles should be taken together.

The physical and moral conditions of the recruit depend (*a*) upon heredity, and (*b*) upon environment. It is necessary to start with this trite saying because of the extreme opinions which are held of the soldier. For his military virtues—his courage, endurance, and the spirit with which he meets privation and hardship in the field—he is lauded to the skies; while for his frailties and weaknesses—his human failings—he is altogether cursed. "Modern knight or lawless brute" he is looked upon whichever picture suits. He is neither one nor the other. There is too much human nature about him to pose as either. What does the country expect of the soldier? He joins the army with his character, if not altogether formed, yet with a bias already acquired, and for which the country is responsible. It has admitted this responsibility by its education legislation. With this character the soldier enlists, and to eradicate from it whatever is bad, and to develop whatever is good would require the most favorable circumstances. In the ever-changing conditions of military life, and which depend upon the military requirements of the empire, it would be hard to expect, no matter how favorable they may be, that they could exercise a permanent influence for good. On enlistment the soldier spends a year or so with the depot, or in the home battalion in a society much the same as he was always in, for his comrades in the barrack-room come from the same classes as himself. Then he proceeds on foreign service, and is forced to mix with races of a lower civilization: with such surroundings how can he attain the knowledge of that higher life which is to protect his health and to raise his moral tone and bearing? If the people who ask for this development believe it to be possible, then their faith is illimitable. If not, the demand can only embarrass military administration. Some of the apostles of this doctrine, and who oppose the institution of a sanitary police, by their arguments convey the impression that a soldier on enlistment should leave his human passions behind him, until he returns to civil life. For why? He is no worse, rather in many respects he is better than his brother civilian. But the risk to him is a thousand times greater.

In a recent exposition of arguments of this kind (they are but poor ones to put into the mouth of a great nation), it has been advanced that because the soldier voluntarily enlists he takes upon himself these risks and responsibilities of his own free will. I have no patience with this argument. It is founded on half a truth, and is more plausible than fair; no doubt it is a good bargain for the nation, but one of the parties to it is in the main ignorant of the danger he runs—nay this ignorance is his chief danger, and for which he often pays with his life. I cannot too often reiterate the responsibility of the nation in this matter. It obtains all the great advantages of the short service system

in a voluntary army whereby its military strength is well-nigh doubled, and it accepts no liability. The miner or railway servant is a free agent when he takes employment, yet should he suffer hurt or damage in the course of his employment he can sue his employer, while the young soldier, exposed to preventable diseases, has no legal claim against the Government. How would the nation like to have the Employers' Liability Act extended to the soldier in such cases? Thrash this question out—weigh every fact—I have no doubt that with a fuller knowledge the nation will accept its responsibility.

The personal hygiene of the soldier obtains its importance from the fact that a large number of men are, for the purposes of discipline and training, and for economic reasons, collected together in a very limited area. Consequently the health conditions of any one individual must affect the health of many others in a greater degree than could possibly occur in civil life. It is an axiom of sanitary science, that the sickness and mortality of any community are (*a*) in direct ratio to the density of the population, and (*b*) to the presence or absence of the elements of decay in their midst—organic débris of all kinds. These facts do not appeal to the soldier unless indeed the sanitary faults are of so aggravated a character as to become objectionable to the senses.

The fundamental principle, then, on which the soldier's health depends is cleanliness (1) of his person, and (2) of his dwelling, without which the air he breathes, the water he drinks, and the food he eats becomes poisoned, and a vehicle for the origin and spread of disease. Recent sanitary discoveries have made this plain, and yet there is no body of men who, if left to themselves, would in regard thereto order their living less carefully than soldiers, and this as I take it through no fault of theirs. The average age of the army proves this assertion. They are indeed the victims of circumstances over which they have had no control.

As to personal cleanliness, the first thing is to teach the young soldier that the surface of the body must be kept scrupulously clean, also his apparel. How important this is it is only necessary to examine the feet and sheltered portions of the body of the soldier after a day's work or route march. As I have already said, the danger is not to the individual alone, it extends to every occupier of the same room. At night the clothes, thrown on barrack boxes, or by the bedside, foul the air, or the *exuviæ* drop on the floors to dry and blow about as dust. So, too, is it with the practice of expectoration, which has not been discontinued, and the danger of which does not seem to be fully appreciated by those whom it most intimately concerns.

It used to be my custom to examine the mouths of all young soldiers on joining their regiments. The want of care shown by them was phenomenal. Between the teeth, often unsound, were lodged broken pieces of food. In many instances—I often found it to amount to 20 per cent. —the gums were soft and spongy, and bled on the slightest pressure.

What a constitutional state did this represent to resist disease, and what a nest for the germs of zymotic diseases to rest and develop in. It will, perhaps, be thought that these are trifling matters. Such is not the case. I vouch for their prime importance.

I recollect in one hill station in India a very serious outbreak of enteric fever occurred a few years ago. I believe many of the cases were returned as typho-malarial fever—a term which has covered a multitude of sins. The weather was wet though not cold. Fires were lighted in the sleeping-rooms to dry the clothes of the men soiled with mud and surface impurities. It was believed that, by the exhalations from this clothing in a confined, damp, and moist atmosphere, the *contagium* of enteric fever was disseminated. It was a curious coincidence that, in neighboring hill stations where this practice was not permitted, there was a marked immunity from enteric fever, though, as regards soil pollution, they were no better off. No sleeping-room should ever be used for the drying and airing of clothes. All barracks should have ablution and bath rooms, with a hot and cold water supply. Washing of the whole body daily should be insisted on. I was much struck a short time ago by an address of the Bishop of Thetford advocating the daily use of baths, not only for the promotion of physical health, but of moral purity.

The importance of sound teeth to the soldier is very rightly insisted on, though no doubt it is not so much so as in former times when, because of long voyages, or protracted campaigns, hard biscuit formed the staple food. Short service, and the use of the breech-loader, also minimize its importance. Still there can be no doubt, to preserve the health and to ward off many forms of sickness, a good set of teeth is no mean armament. It has often occurred to me, this being so, why it has been that, while the state of the teeth on enlistment is a matter of stringent regulation, yet afterwards it is practically neglected. The Army Medical Staff, by their present training, are not competent to deal with it. In every large garrison, if not, certainly in every district, there ought to be appointed a duly qualified dentist, and for duty with troops only.

The effect of temperance on the health of the soldier cannot be exaggerated. It has been of inestimable value. The introduction of short service was coincident with the growth of more sober habits among the people, and therefore its good effects soon extended to the army. It has lessened crime and sickness, for "disease dogs the footsteps of crime," as well as being the direct result of drink. So great, so beneficial, a change occurring in the habits of such a large body as the army, naturally leads to the inquiry of its effect upon the spread of enthetic diseases, and upon the prevalence of enteric fever in India. These are practical questions, which must be answered even though the answers may not be altogether as expected or desired. I recollect some years ago serving on a committee to inquire, *inter alia*, into the first question. The president of that committee was the colonel of a distinguished Scotch regi-

ment and a great advocate of temperance. His opinion was that the more temperate the regiment the more prevalent in it were enthetic diseases. It stands to reason, unless there are restraining influences, this must be so. I have heard general officers of great experience assert that the prevalence of these diseases was the complement of the otherwise good health of the troops. My own experience coincides, and it has obtained support from many medical officers with whom I have discussed this question. As regards enteric fever there can be no doubt that indirectly temperance renders the soldier more exposed. The connection is a simple one to trace. In every bazaar, shops for the sale of aërated waters, ginger-beer, and sherbet, have been multiplied, and as enteric fever is chiefly a water-borne disease, it needs no divining rod to indicate the danger. I do not make these remarks in disparagement of temperance. God forbid. To do so would be a crime. What I wish to suggest is that, though it has effected a great moral improvement in the soldier, and in his health conditions, yet it has exposed him to two new dangers, both originating in his natural instincts, but through the existence of causes which human foresight can control and prevent. Every apostle of temperance in the land should throw in his fortunes with those who desire to grapple with these questions, and not to shirk them by ignoring their appalling consequences.

Intimately associated with temperance is the smoking habit. Whatever ill effects may have been due to it formerly, whether from smoking to excess, or from the quality of the tobacco, this to any extent cannot be said at the present time. A few cases of dyspepsia, or of disturbance of the nervous or circulatory systems, no doubt do occur in those so predisposed, but the balance is decidedly in favor of the smoker. After a hard day's work it has a soothing influence, and in malarious countries it is a protective. In moderation, and this now is the rule, there are many things which might be said in its favor.

Cleanliness of the dwelling depends chiefly upon personal cleanliness. Its importance cannot be exaggerated, for "dirt breeds disease." This applies not only to the buildings themselves, but to their immediate surroundings. In a word, good scavenging is essential to health, and yet there is ever present the constant danger of its being neglected. If buildings are well sewered and drained, and if the water supply is abundant and good, there is such a sense of security developed that the *minutiæ* of sanitation are apt to escape notice, and yet there is no factor so important to prevent zymotic diseases taking a hold of any locality, and to maintain a high standard of health, as surface purity. It is to this want, combined with density of population and the present facilities of travel, that has made influenza so persistent a visitor in recent years. The soldier never thinks of these things, because he has not the knowledge to enable him to draw correct conclusions. It was because of the want of that knowledge, and, which at the time was not confined to the soldier alone, that Sidney Herbert and Florence Nightingale urged upon

the government of the day the institution of the Army Medical School, so that this knowledge should be always available in every corps, not only for the inception of sanitary measures, but to guide and restrain the soldier in his every-day life.

I do not intend to pursue the question of the sanitary needs of the soldier further. Sufficient has been said to indicate what they are, and how caused. I propose now to inquire into what the service can do for him, and what he can do for himself. If I am correct in the view I have presented of the soldier this work must be initiated by the service; by himself the beginning will be never made. No doubt, if started on the right road, he will be able to contribute largely to this end; indeed, without his coöperation all efforts must be fruitless. My experience—and it has been varied, embracing all arms of the service—is that the soldier is most amenable to advice provided it is given him with a "sweet reasonableness," and not forced upon him "by order." Point him out the better way, and sympathize with him in the trials and difficulties which beset him, and half the battle is won. Only let him understand the necessity of such measures and that they are intended for his good, and he is supremely grateful. I knew one medical officer who adopted this line: no attempt to trade on it was ever made. It assisted him much, not only in the treatment of individual cases of illness, but in sanitary affairs generally. In the barrack-room this officer earned the title of "the soldiers' friend." Up to the present time, since the introduction of short service, this system of advice and instruction has been but very partial, and so of course have been the results. What is really wanted is a systematic teaching of the soldier in all that concerns his health, and of which he himself is either the arbiter, or if not, it will afford him such a protection as he has not hitherto known.

By whom should this duty be undertaken? It hardly needs to be stated that it must rest with the Army Medical Department. Such was the opinion of the pioneers of army sanitation. Why then repeat it? Simply because that opinion, or the grounds on which it was based, has been forgotten, or at all events it is only acted on in a half-hearted kind of way. The foundation of efficient army sanitation must rest on a regimental basis. A regiment in the present day is a training-school to turn out soldiers as rapidly as is consistent with efficiency, who pass in quick succession to and from the civil population. With it is no skilled sanitary authority whatever. The responsible officer (quartermaster) and his subordinates, however desirous they may be to do what is best, must fail because of the lack of special knowledge. The two crying questions of the present time is the prevalence of enteric fever in India, and of enthetic diseases in the army generally. They will never be effectually dealt with until each regiment has once again its own medical officer. Until that time comes, even were every medical officer a Parkes or an Abernethy, the army is deprived of one of the most important functions of the Medical Department.

I cannot leave this branch of the subject without alluding to an anonymous article ("The Soldier and his Masters") which appeared in the January number of the *Contemporary Review*. With its high moral purpose I have a great sympathy, but with its practical conclusions, in so far as the measures to be now adopted to combat enthetic diseases in the army are concerned, I cannot agree. They are too utopian to cope with the actual circumstances. There is a present evil to be met. It is of such a magnitude that to wait for the dawn of a higher morality is impossible. This, however, by the way: I am not going to touch that question further. What I wish to point out in reference to that article is the coincidence that in the article "The British Soldier in India and Enthetic Diseases," I also urged that influences should be brought to bear upon the soldier to raise his moral tone, and to preserve his health.

The writer of the article suggested that there are three classes of men on whom this duty lies, namely combatant officers, the Medical Staff, and chaplains. So far as my experience goes combatant officers have not failed in this duty. They have spent their time and money ungrudgingly to give healthy amusements to the men, and in this respect the soldier is infinitely better off than young men belonging to the same classes in civil life. I am not quite sure whether chaplains can do more than they now do. I am, however, in complete accord with the writer in the opinion that medical officers should use all their influence for the moral and physical welfare of the soldier. It is because this influence cannot be effectually exercised in the present relations of the Medical Department to the army, and until once more a medical officer is appointed to each regiment, that I call attention to that article. It is well worthy of careful consideration.

In conclusion I desire to draw attention to the tendency which exists in some quarters of relegating personal hygiene to a second place. A few years ago in Indian cantonments the public health was to be secured by the trench system of conservancy. At the present time inoculation for diseases due to filth is the nostrum. To-day immunity from cholera is to be obtained. To-morrow it will be a serum for protection from the plague, and so it goes on. As vaccination and the inoculation for rabies have been followed by such good results, so also it is argued that safety can be procured from diseases more thoroughly due to faults of sanitation. Without detracting from the value of these discoveries I feel bound to record the opinion that the ultimate gain to humanity will be nil unless at the same time the vices of sanitation from which they spring are removed. There must be no cessation in improving the sanitary conditions of the people wherever the army is quartered. It is the amelioration of those conditions which adds to the reign of Her Majesty a lustre which time will never dim. With the hope that this year, so momentous in the history of the empire, will see a still further effort made to improve the personal hygiene of the soldier, I bring this article to a close.

THE CANADIAN MILITIA.—A CRITICISM.

By Capt. Henry J. Woodside, Canadian Cavalry.

(*From the United Service Magazine, London.*)

THE Militia of Canada dates its origin in Upper Canada, now called Ontario, to the War of 1812, and in Quebec and the other eastern provinces, to a far earlier period when the French were struggling with the Indians.

It was, however, during the War of 1812 that the Canadian Militia, French and English speaking, made a record of fidelity to the crown, and bravery in the field that won for all Canadian corps the honor of wearing blue facing as royal regiments, an honor enjoyed to the present day. In the victories over their enemies at Queenston Heights, Chateauguay, Lundy's Lane, Chrysler's Farm, and many less important engagements, they, side by side with the regular British regiments, fought with a gallantry that earned for them the highest praise from British commanders and historians.

The last words of Major-General Brock, the hero of Upper Canada, mortally wounded at Queenston Heights, were, "Push on, York Volunteers!" to the gallant men whom he was leading on, and who fought desperately to avenge his death. The spirit of the United Empire Loyalist was strong among these brave men.

During the rebellion of 1837–38 the Canadian Militia played an important part, more particularly at the "Windmill" affair, where a body of 500 foreigners and rebels were dislodged after severe fighting. When the *Trent* affair in 1862 threatened to precipitate war between Britain and the United States, and again in 1866 when hordes of Fenians hovered on the borders of Canada, Canadians sprang to arms with a promptitude that filled the country with drilling and arming men. The Wolseley expedition of 1870 demonstrated the usefulness of Canadians in a campaign through a wild rough country, and led to the employment in Wolseley's Egyptian campaign of 500 Canadian voyageurs to overcome the Nile rapids.

In the rebellion of 1885, after the first disaster at Duck Lake, where many brave men were shot down by an unseen enemy, the Militia hurried to the front by long and weary marches, fought three actions with credit to themselves, against a foe whose methods of warfare have often baffled forces vastly superior to their own, subduing the rebellion among the Indians and half-breeds, after a loss of over forty lives to the force and auxiliaries.

Since the confederation of the provinces in 1867, the Militia has been under the control of the federal government of Canada. Originally a force of 45,000 of all ranks, it has now been allowed to decline to 35,000, with the promise of a further reduction to 25,000.

Like the military arm elsewhere under the British flag, this force has

been systematically neglected in time of peace, and it has required the powerful stimulus, since the Fenian raids, of a rebellion and a threatened war, to secure for it proper recognition. After 1866–70 the force declined until 1885, when it took a new lease of life, only to relapse until the Venezuelan message of President Cleveland made war among the immediate possibilities in 1895. This brought parliament to a realizing sense of its duty to its defenders. It was thus that by unanimous permission of the house of Ottawa, a resolution calling for the expenditure of $3,000,000 (£500,000 sterling) was passed to provide for the rearmament of the Militia and improving our defenses.

Even up to the camps of 1896 none of the active Militia was armed with any better weapon than the old Snider-Enfield carbine or rifle, and the field batteries with antiquated muzzle-loading 9-pounder field pieces. The work of re-arming is not yet completed, and the change to the Lee-Enfield weapon for infantry and cavalry, and breech-loaders for the field batteries, goes slowly, very slowly, on. Some 40,000 stand of carbines and rifles (Lee-Metford, or, as it is called here, Lee-Enfield) and about twenty-four breech-loading 12-pounder guns were purchased in England and have been brought over. It is also understood that a number of heavy modern guns for fortifications, and a large quantity of new equipment is being purchased in England by the government, for use in Canada.

By a ruinous system inaugurated many years ago, of biennial drills, whereby half of the Militia was drilled each year, the foundation was laid for the persistent demoralization of the rural portion of the force. A better way to destroy the value of the whole Militia could hardly be devised, and its results are to be seen in the readiness with which the total of the force was reduced from forty-five thousand to thirty-five thousand, and still lower.

To the credit of the new government it may be said that one of the first of the reforms in the Militia department was a return to the early plan of a camp or a period of drill at headquarters for each corps every year. It is said that a further reduction is contemplated to twenty-five thousand men to enable the government to keep up the programme of yearly drills.

It is always the complaint of our governments, that parliament or the country will not sanction votes of sufficient money to fully serve the interests of the force. This statement is open to doubt. Outside of a certain amount of opposition to the Militia votes, emanating from a few representatives who never can see the value of protection until the storm breaks, there is not a disposition throughout Canada to stint any wise expenditure to keep the Militia efficient. There is a grave suspicion that the moneys voted from time to time for this purpose have not always been wisely expended or have been diverted from their proper objects. In one case, some years ago, most of the camps of instruction were cancelled for the express purpose of using the money to be thus ex-

pended in purchasing new rifles. The new arms were not purchased at the time, and as far as can be learned the money saved in that manner was diverted to other purposes in which the militia had no interest whatever.

The fact of the matter seems to be that the Militia department played the rôle of the weak sister to the other departments and was systematically robbed for the benefit of the great patronage-giving and expending departments. In short, the impression is that after the others got what they wanted the remainder of the money was allowed to go into the militia department.

A certain amount of money is expended each year in improving and repairing the three principal fortresses of Canada, Esquimalt, or Victoria, in British Columbia, Quebec, and Halifax. The former is a chain of modern sunken gun-pits, defending on the one side Victoria Harbor, on the other Esquimalt Harbor, graving dock, arsenal and Pacific fleet depot. Quebec, barring the passage of vessels up the St. Lawrence River, is chiefly strong because of its position and command of the river, but the works are old, mostly of stone. Halifax Harbor is well defended by new and old works on island and on mainland. None of these are a menace to the United States, but are maintained owing to their exposure to foreign fleets, In the three or four thousand miles of frontier line between Canada and the United States, it may be broadly stated that not a work is constructed, not a gun is planted with a view of defense even against our southern neighbor.

Canada paid a proportion of the cost of the construction of Esquimalt defenses, and pays a proportion of the cost of maintenance there of a small force of Imperial engineers, but outside of this she cannot consider herself chargeable with any important sum for Imperial defense. It is, therefore, plain that no niggardly policy should be pursued toward her own military forces, as it is after all to them she may be compelled to turn for her entire defense in trouble.

Instead of seeing how little parliament can do for the members of the force, it should strive to see how much it can do for them, knowing that in time of stress they will well repay the care bestowed upon them. No one can argue that pay is extravagant. It ranges about the same as in the Imperial army. Privates of the active or real Volunteer Militia are paid fifty cents (about two shillings) per day while in camp, and in lieu of rations are allowed twenty-five cents per diem. From eight to ten, or sometimes more, privates sleep in one small military bell tent, in gray army blankets on the bare ground, and are served with food in this tent. Their clothing is usually cheap shoddy. Each one must buy his own helmet, and everything else including shoes, underclothes, etc., over and above a forage cap, tunic, trousers, rifle, bayonet, belts, knapsack, haversack, and great coat. Their food is of the plainest, cheapest kind.

Now with this contrast the treatment which a private of the New York State (U. S.) militia, numbering 13,148, receives from his State

Government. His pay while in camp is $1.25 per day. His "board" costs just $1.00 per day by contract paid by the State. His food is of the best, spread in fine mess rooms. He sleeps with one comrade in a floored tent. To each is allowed a cot and mattresses. The tent is furnished with all utensils necessary for the toilet.

The estimates for the Militia department for the year ending 30th June, 1898, to be voted a total up to $1,356,456. The principal sums are:—Pay of staff and permanent corps and active militia, including allowances—$338,806. Annual drill of the Militia—$300,000. Military properties, works, and buildings—$100,000. Provisions, supplies, and remounts—$110,000. In addition, the amount chargeable to capital, on arms, defenses, etc., is $330,000. In the above estimates, the sum of $300,000 is devoted to the annual drill of the active force. The government pays about $30,000 per year in pensions on account of military services, some of the amount given being traceable to as far back as the War of 1812.

The total Canadian force as per last establishment lists is, permanent force enlisted for three years continuous service:—cavalry, 145 officers and men, 101 horses. Field batteries, officers and men 173, horses 71. Garrison companies of artillery 167, horses 7. Infantry 316, horses 4. Total of all ranks—801, and 183 horses. Active or volunteer militia drilled for twelve days each year:—cavalry, all ranks 2295, horses 2099. Artillery, field batteries all ranks 1734, horses 835. Garrison artillery all ranks, 2294. Engineers 212. Infantry and rifles 28,962, horses 354. The total force of active militia is embraced in 36 squadrons of cavalry, 17 field batteries, 5 regiments and 7 companies of garrison artillery, 2 companies of engineers, 91 battalions and 4 companies of infantry and rifles. The total is 35,497, and with the permanent force a grand total of 36,298 and 3471 horses. The officers number 3090.

At a glance it would seem as if Canadian corps were unnecessarily topheavy. The government recognized the fact that in case of trouble arising with a foreign nation, it would be much easier to get men than officers and non-coms. Hence an infantry company has 3 officers, 3 sergeants, 3 corporals, 1 bugler, and 35 privates, or a total of 45. The squadron of cavalry under the new establishment have each 4 officers, 4 sergeants, 3 corporals, 1 trumpeter, and from 35 to 54 privates, the total establishment of a squadron varying from 50 to 86. In each case in emergency, from 25 to 50 privates could be added to the unit without calling for any increase of non-coms. except the appointment of several lance-corporals. The field batteries comprise 7 officers, 9 sergeants, 6 corporals, 6 bombardiers, 2 trumpeters, 47 gunners, 25 drivers; total all ranks 102, 6 guns, 49 horses, 6 ammunition wagons. Cavalry squadrons are allowed a wagon and team of draught horses.

The permanent force of 801 absorbs $215,000 per year. This is a large sum, and the question arises whether the expense might not be cut down some without reducing the force or crippling its operations. As a fight-

ing body its numbers do not cut much of a figure. In addition to other duties it forms the training schools for officers and non-coms. of the active force, who are permitted to attend short courses of three months or long courses of six months, by which means they may qualify for rank, by taking certificates therefrom. All officers in the active militia, except graduates of the Royal Military College, are appointed provisionally, and rank for pay as second lieutenant until they qualify at a military school. The permanent force is scattered in companies, squadrons or batteries, from one end of the Dominion to the other, and is a very efficient force.

The Royal Military College absorbs $65,000 per year. This is a valuable institution for the country, but it has been badly managed and costs entirely too much. Moreover, the graduates from it received scant consideration in the past from the government when appointments were made to commissions in the permanent force. Those who did not get a commission in the Imperial army, where the successful ones have always stood high, had to drop back into civil life. As a matter of justice, graduates from the college should have the preference when appointments are made to the permanent force. A radical change is being made in the management of the Royal Military College, and the new commandant, Colonel Kitson, of the Imperial army, bids fair to revive its former high reputation, and no doubt the expense will be cut down.

There is not in Canada a large number of young men of wealth and leisure from whom to obtain officers, nevertheless the Canadian officer devotes a great deal of time as a class to his duties, is a painstaking, conscientious gentleman, who, amid much discouragement, labors bravely to advance the efficiency and discipline of the corps with which he is connected.

There has been a tendency of late years to neglect the rural corps to the advantage of the city corps, because the latter are usually smarter in their drill, and are more readily available for immediate service. But no officer who has seen the splendid material which came into camp year by year when the rural corps were the backbone of the Militia of Canada, and who has seen the raw material transformed in less than a dozen days into steady marching units, would or should make such a blunder. The rural corps should be fostered in every way, with a view of their regaining the prestige they once had for picked material. That system of alternate year drills has had a grievous influence on the quality and *morale* of the rural corps, but wise management can soon eradicate the evil.

The average Canadian takes very readily to military life, loves camp work, is usually a fair shot, and is handy with the axe, spade and other tools. During the war of the American Rebellion, Canadians were in great request by American recruiting officers, and every device was employed to secure their enlistment. In this way some 40,000 or more of them served in the Northern army. From officers who had bodies of Canadians in their command, come only words of praise for their cheerfulness, endurance, pluck and usefulness. Lord Wolseley, who knows

the material of which good soldiers are made, has spoken highly of their quality for service, and he had every opportunity to become acquainted with every peculiarity they have. He was so well pleased with them on his Red River Expedition in 1870, that he procured the services of 500 voyageurs on his Egyptian Expedition to pilot his boats up the Nile River.

As under the Militia Act, every male inhabitant of Canada between the ages of 18 and 60 years, is liable, with a few exceptions, to be called out for military service in defense of his country, it will be seen that from a population of over five millions, a large force could be raised in an emergency. American military officers have estimated that Canada could raise a force of over 500,000 in a few months. The equipment of such a force would be another thing, although rifles are very plentiful in Canadian homes. During the American Rebellion the South, with a population of about six million whites, put into the field from first to last in four years, over one million men. It is quite true that a militia force is a very uncertain quantity in action, but mixed with regiments of regulars it becomes a formidable weapon in a good general's hands.

There is much in the Canadian service that requires reforming and remodelling. A good weapon is being issued. The belts and equipment are old and worthless. The saddlery and harness of cavalry and artillery is nearly worn out. The swords of the cavalry are poor. With volunteer cavalry more than regulars the sword should be fastened to the saddle, few militiamen become accustomed to the jerking of the sword at the waistbelt.

Moreover, in the nature of things, his chief weapon will be his carbine, with which he is more familiar than with the sword. The lance is not used among Canadian cavalry except in one or two special cases. Owing to the small size of the squadrons, all drill is done in single rank; the infantry drill in two ranks. The field batteries have or will soon have six gun establishments. Otherwise the drill in all arms is the same as in the Imperial service.

Outside and apart from the Militia is a force of about 800 North-West Mounted Police, for service in the new western provinces. They are dressed like some of the regiments of Dragoon Guards, are drilled and disciplined as cavalry, but the rank and file carry no swords. Each man is armed with a Lee-Metford carbine and heavy revolver. In drill, physique, and *morale* there are few finer forces in the world. No militia corps exist in their territory.

In the sixties, when the clothing of the Canadian Militia was purchased in the British Isles, the force was well clothed with good material of permanent dye. Now the material used in the clothing issued is as a rule of very inferior quality—very often a poor shoddy that is a disgrace to the country. To make it stand wear the material is made of a thickness which, in hot summer camps is an outrage on the men who have to wear it. Gross swindles are sometimes perpetrated on the department

in the furnishing of blankets, etc. It is asserted on good authority that the clothing for the militia could be purchased in England, of far better material, and at about half the price now paid for it. This is so much extra, for which the militia is not properly chargeable. The clothing for the permanent corps is in part at least bought in England.

To encourage rifle shooting the government has made grants from year to year to various associations throughout the country. Of late years, through the efforts of several enthusiastic riflemen, the Canadian Rifle League has become very strong, and usually nearly 140 teams of ten men each take part in its simultaneous matches twice a month throughout Canada from Atlantic to Pacific. The Martini-Henry rifle and the Snider-Enfield is still chiefly used. Then there are the Provincial rifle matches in midsummer and finally the "Bisley" of Canada, the Dominion Rifle Association matches at Ottawa, where some five hundred of the best riflemen in the Dominion, mostly members of the militia, compete for valuable prizes and for the honor of becoming one of the twenty best shots who are sent to Bisley the following summer. This year the department has done wisely in giving a free issue of Snider ammunition, which will encourage the sport everywhere.

In the earlier years of its existence the Dominion militia was drilled in camp for sixteen days every year. Then for a time the yearly drill was cut down to eight days. Later on, when the biennial system was adopted, the days in camp were increased to twelve, at which it now stands. One day is allowed to go into camp, one day to break camp, one Sabbath deducted leaves nine days, not counting one for target practice and a possible rainy day in the June camp. Even for infantry the time is too short. For cavalry and artillery it is manifestly out of the question to get a satisfactory showing from that brief space of time. If nothing better can be done, the days for annual training for cavalry and artillery should be increased to at least sixteen in camp.

There is another fly in the ointment. The militia estimates are a hand to mouth affair. When parliament meets late in the winter or spring no provision can be made for June camps, hence the portion of the rural corps available in autumn is called into camp. As that is the season when the average farmer and his son are busy, the best material cannot be secured, and when company officers have to fill up partly with inferior loafer material in the fall to go into camp, the decadence of that troop or company is usually begun then.

It is really necessary and not unreasonable that the militia estimates should be voted if possible one year ahead of the time they will be needed, so that commanding and company officers can be informed from two to three months in advance of the date of their camp; any uncertainty in that respect is likely to cast a blight upon the corps, as good men must be given time to arrange for substitutes to take their place in factory or on farm. No fall camps should be called. Every corps should be under canvas in June. Arrangements should be made to have the

city corps go under canvas occasionally. At present they never go into camp except when on a visit to some other city on a military holiday celebration. The brigade camps for the rural corps are held at convenient points for their mobilization when they assemble to the number of from 1500 to 2500. In the earlier days from 5000 to 7000 men were accustomed to assemble in brigade camp at Niagara.

Officers who are accustomed to correspondence with business houses notice the difference in their correspondence with the department. Although the officials seem courteous and painstaking, there is much delay in getting answers to communications, even if an answer is vouchsafed to a letter sent through the proper channel. Ambitious and energetic commanding officers soon have their ambition chilled and their energy paralyzed by the slow evolution of ideas through red tape bindings. More prompt answers to communications would be appreciated.

But over and above all this criticism, like the charmer in Pandora's box, there is hope for the future. The new government have begun well in dealing with the Militia. It promises new arms, accoutrements, and other necessaries, also yearly drills. A member of the force for thirty-three years, Dr. Borden, M. P., was selected a year ago, on its advent to power, as Minister of Militia and Defense. He is in hearty sympathy with those he represents, with whom he has been identified so long, and by whom he is regarded with respect and confidence. It is a general hope that his recent injury in a railway accident may not lead to his permanent withdrawal from the portfolio. We have had too many changes. Four different ministers in about two years is not a good record for any department.

In the selection of Major-General Gascoigne as general officer commanding, the office has been filled by an imperial officer who is striving to make himself familiar with the wants and peculiarities of the force under his command, and to avoid the extreme strictness on one hand, and the over laxity on the other, characteristic of the administration of some former general officers commanding. He already has the sympathy of those with whom he has come in contact. The appointment of Colonel Aylmer as Adjutant-General by the incoming administration a year ago was hailed with pleasure, as he has the reputation of being a fine officer and administrator.

There is no doubt the curse of politics pervades the Canadian service to a more or less extent. Some corps and commanding officers get more than their share of what is due to them, Others do not get their share even of the scanty dole. The knowledge of this to an otherwise conscientious officer, ambitious as to the equipment of his corps, leads him into the temptation of pulling wires to obtain what he is entitled to but does not get. An even-handed justice that will treat all alike can remove the cause for using political "pull" at headquarters, or will render its efforts nugatory.

THE ARMY OF SPAIN: ITS PRESENT QUALITIES AND MODERN VALUE.

By LEONARD WILLIAMS.

(*From the United Service Magazine, London.*)

PASSING a window in Cadiz, my attention was recently drawn to a pamphlet of modest size—something under a hundred pages—titled "Don Ramiro's Military Reflections on the War in Cuba." Partly from mere curiosity, partly to see whether its contents would in any way affect what I then intended to say in this article, I bought a copy, expecting to find either a treatise of covert "filibustering" sympathies, or else a bitter condemnation, probably in satire, of the present execrable government of Spain. I was at once surprised. The tone is tamely patriotic. Save that the Spanish people, by reason of their fatal pride—which is losing them Cuba, and will lose them Spain if they continue it long enough—would look upon any work suggesting imperfections in their army as a rank heresy, there is no reason whatever why the writer of this moderate and scholarly essay should not sign his name in full upon the title-page.

Don Ramiro then, as we must be content to call him, seeks to prove, through seven distinct chapters, elaborated with no little care and ingenuity, that want of cavalry is the sole cause of failure of the Spanish arms in Cuba.

The term "guerrilla warfare," especially since the invasion of Pinar del Rio, has been becoming less and less applicable to the Cuban campaign. The so-called *partidas* of the enemy, which according to the "official" telegrams of the Spanish press are invariably routed from half-a-dozen to a dozen times daily, are simply the advance guards of large masses of men who do not, for the moment, choose to join battle. It seems that neither is the nature of the ground at all what those in Spain would have us believe. It is not mountainous, or wooded, or otherwise intricate to any unusual degree, nor worse than might be expected of the theatre of an average European war. There is a great deal of perfectly plain country, such as Santa Clara province, for example, offering no facility for ambuscade, and if anything better known to the Spanish than to the rebel army, for so completely have the latter overrun one province after another that as a rule they are both foreign to, and ignorant of the precise quarter where they may be called upon to fight.

Consequently there is something casually or wilfully erroneous in all the talk we hear about ambushes, superior knowledge of the ground, and so forth. Don Ramiro, I have said, seeks a better reason in claiming that the Spanish army is composed almost in its entirety of infantry, whereas the rebels, mounted to a man (which is an exaggeration) are able to move four or five times as fast as their adversaries, and to wheel, surround, charge and retreat with perfect ease and impunity.

In this I readily admit there is something. It would be a boon for Spain if a portion of her forces could, say, be converted into mounted infantry. But mounted infantry takes time in the making, and where are the horses? Again, the well-meaning pamphleteer makes a mistake in ascribing to cavalry qualities which border on omnipotence. Not only, should he bear in mind, is cavalry expensive, a very important consideration for Spain—and must be perfect to be any good at all—but there is reason to suppose that its value is on paper greater than in practice. Myself, I should not think of touching on this part of the question had not my experience as a military tutor shown me that the most intelligent of our officers regard the use of cavalry in warfare of the future and immediate present as a problem quite unsolved. Contemporary opinion is pretty nearly evenly divided, and while there are those who speak of coming battles on a vast scale of mounted soldiery alone, others predict that cavalry is to figure in reduced numbers and importance, for outpost duties, light skirmishing, and nothing more.

In pursuance of his contention Don Ramiro proceeds to compare the old Spanish *cabalgada*—notoriously successful in antique times—with the modern *raid* (the very word he quotes). They are identical, he says, and of sovereign worth so far, that is, as the horse is concerned. It must, I think, be admitted that cavalry, if properly and adequately met at the moment of charge, is no match for trained infantry.

Now the Cuban rebels, who are able to fight when requisite, on foot, are, generally speaking, trained soldiers, from the point of view of that system of warfare which best befits them. Much trash has been talked about their being unarmed, undisciplined, and so forth. It has been laboriously propagated by the Spanish press. But such is not the case. Thanks no doubt to foreign interference a great majority are armed with repeating rifles, and have shown themselves to be no mean marksmen by the constancy with which they pick off Spanish officers. Although, as Don Ramiro reminds us, in the old *cabalgada* days a clothyard shaft would *travel* four hundred yards, yet if a bit of wind were blowing it was surely not "as the crow flies," while in the time required to string, draw, and discharge a bow once you may put in half-a-dozen infinitely straighter and infinitely less tiring shots with a Winchester rifle. A horse from weight and mass is invaluable if you can get him within striking distance of an enemy on foot, but he is also a large and handy target up to half a mile, and a cavalryman dismounted in the process of a charge is as useful in his isolation as a walking-stick in a thunderstorm. Those of the Cuban rebels who have no rifle ask nothing better than the *machete*, a very deadly instrument at close quarters, a lighter and more convenient form of steel than a fixed bayonet, and a weapon to which in the work of the fields they have been accustomed from boyhood. Custom in the use of arms is half the value of the arm. I have seen a Spanish peasant from Navarra or Aragon handle and throw and stab with a *navaja* in a way that would astonish northern folk. Conse-

quently the *machateros*, though armed with little, are armed with all they need to do severe execution, as is proved by the returns, probably understated, of Spanish slain in this manner. A great proportion of the *cabecillas* have established their natural aptitude for command, developed and fostered no doubt by intense hatred of the Spanish rule, and if, instead of feebly crowing at him for being a mulatto the Spanish press were to have recognized Maceo for what he also was, a very skilful and wary general, who had been the dread of their officers ever since the earlier rebellions of a score of years ago, they would have set themselves in a less absurd light in the eyes of European critics, and have better prepared their army to face a man of no mean genius and activity.

To return to the cavalry question. Don Ramiro's is the best of the arguments, sorry enough in general, by which the Spaniards would extenuate their lagging and desperate campaign. The real reason, patent enough to any foreign resident in the Peninsula, one could not, I suppose, expect to hear from the lips of a patriot. It is simply that the Spanish army, cavalry, infantry, artillery, engineers—all branches of the service alike—have had no schooling in their trade. From brigade-general to private not a man has grasped the rudiments or requirements of war. For the troops there is no drill, no practice in gunnery, or swordsmanship, or gymnastics, or any branch of military routine. Regulars and volunteers are execrable shots, firing, as is to be expected, miles over the enemy's head. Even physically they are the wretchedest of beings, wiry enough, but undeveloped, since nothing is done to strengthen, diet, or improve them. It makes one sad to see the quality of the expeditions packed off in heartless shoals to Cuba, boys, to look at, at fifteen and sixteen, who have never held a rifle till this moment, and now are almost ignorant which end it fires, good lads—too good to go to such uneven butchery—with cheerful, patriotic, willing faces, but the very antithesis of a soldier. No wonder the matrons of Saragossa would have had them stay at home. And if the troops are inefficient the officers are worse. In the first place the military profession does not stand high, which is in itself a bar to efficiency. By something more than a coincidence the best officers are those who are socially thought most of by their countrymen, as in England, Germany, and Austria. In Spain the army approaches being held in social contempt, which is in no way counterbalanced by the reiteration, before every officer's name, of *bizarro* and other fatuous epithets of the press. The army and the church, in fact, are the two professions no man chooses if he has the money or the brains to choose anything else, and a girl who threatens to become an old maid is told in jest by her sisters that she will have to marry an officer, which illustrates the national bias. The Spanish officers cheapen themselves. They are never out of uniform with a sword tinkling at their side. They carry a sword and spurs about them everywhere, to church included. I have known a captain coming from Cuba to wear spurs on shipboard daily for three weeks. Their assump-

tion transcends belief, yet it is admitted throughout the Peninsula that their preparation and qualifications are practically nil. A proposal has even been approved that bachelors in arts shall be admitted, without further examination, as second lieutenants. To this latter rank are promoted hosts of sergeants, a practice ultimately subversive of discipline if carried, as here, to excess. But sheer want of instruction, bookwork, backed up by range-firing tactics, military surveying, map-drawing, sham fights, and so forth, is the glaring and primary defect, and during the Cuban rebellion three generals have fallen into trouble, not from lack of valor, but from lack of knowledge. Precisely the same incompetence prevails in the navy, though on this it is not of course my province to dwell. Thus, in a word, neither officers nor men possess the elements of technical warfare, and all is left to courage.

This people, so fatally conservative of the color of tradition, does not appreciate that since the devil-may-care campaigns of the Netherlands and such-like, war has been reduced to rule. In such and such a case you must do so and so; if you do anything else you will fail. If there be occasions when sheer dash, unbacked by calculation, comes in they may be magnificent, like the charge at Balaclava, but they are mistakes. The situation should not have been created, and even if the end is won the cost will have been absurdly dear. But a Spaniard is to the core romantic, a gift not altogether admirable in these days. The very tap of drum sets all his martial blood afire, and in picturing an ancestor storming a breach with the Spanish flag in one hand and a bloody sword in the other, he forgets how dismally modern and prosaic is the hum of that unseen enemy, a rifle bullet, sighted, aimed, and fired five hundred yards away.

I have talked with Spaniards of all grades and provinces, and two qualities alone have they advanced in favor of the Spanish soldier—his ability to go without food for a long time, and his bravery. A gentleman speaking to me at table lifts a scrap of salad on his fork, and says, "This is why our army, in one respect at least, is better than yours or the German. Your men require to be fed solidly, and often ours will last and fight for days on this and water!"

But if our troops require more food than the Spanish our commissariat is proportionately equipped to meet the additional demand, our *presupuestos* are proportionately heavier. Our regimen is more liberal, costs more, and we can afford to pay more, otherwise I should admit a value in the argument.

Southerners, such as the Spaniards or Italians, are, I have noticed, given to imagine that the fine frenzy of a desperate exploit is limited to their warm-blooded selves. They underrate our dormant capabilies of passion. They have not heard of the Scotchman at Majuba, who, with half his face blown away, groped for a rifle to have one more shot at the victorious Boers. They could never bring themselves to associate our reputedly frigid temper with the flaming heroism of Chard, and Brom-

head, and Melvill, and Coghill, and the old Etonians who fell at Laing's Nek. Yet, if ardor is bravery, not only Spain, or Italy, or Greece, but we have it, and every nation that I ever heard of, except, possibly, the Chinese. What was Nelson's feverish delight at Copenhagen?—the love of fighting at close quarters to the inspiriting music of a hundred-gun battery. What noble ecstacy was over Winkelried at Sempach? or did Charles of Sweden burrow into Russia's vitals with a few calm squadrons of unyielding horsemen?

It is cowardice and coldness that are the exception in armies, not courage, and the fire and savagery of onset. What *they* mistake for coldness in us Northeners is the fine restraint of previous military education (for in these days even courage has to look ahead), the leash that holds the bloodhounds, slipped at will, and often slipped too soon.

The Battle of Spurs sticks in a schoolboy's memory by reason of its newness—an enemy preferring flight to fighting. If for the crucial day of Isandlwana we could have chosen a British regiment likely to flinch or break, it would have been, perhaps, the Twenty-fourth, new levied, the rawest of the raw. Have we ever heard that one of those recruits showed fear? "They died like stones," said the Zulu warriors, speaking reverently of them afterwards, "each in his place."

So as I should be the last to deny the bravery of the Spanish army as a whole, I at once assent, "Yes, it is brave—as ninety-nine per cent. of uniformed armies are brave—what then?" Bravery and a small appetite are not stakes high enough to win with on the board of military action, nor is it in the power of one nation to claim a paramount courage, much less let that claim supplant the soldier's schooling. Courage we all have, if we are put to fight, courage under aspects slightly differing —differing in shape, not in degree—but still courage; and it is for want of our seeming base *minutæ* of war, the marksmanship that hits, the steps that charge, and march, and advance, and retire; the arts that help to win a battle, as seamanship helps to propel a vessel, that one of all brave nations is falling swiftly from a high estate.

The lesson of three centuries ago is not the lesson of to-day. It is no use to pose upon a crumbling pedestal and scoff at Time, who takes us by the forelock, rather than we him; with him we must go, his word we must obey, or by his certain vengeance we shall cease to earn, and prematurely, to live.

COAST ARTILLERY PRACTICE; HOW BEST TO CONDUCT IT WITH A VIEW TO THE REQUIREMENTS OF ACTUAL WARFARE.

By Captain H. S. JEUDWINE, R. A.

DUNCAN GOLD MEDAL PRIZE ESSAY—1897.

(*From Proceedings of the Royal Artillery Institution, July, 1897.*)

I. INTRODUCTION.

THERE can be little doubt that the subject of this essay has been opportunely chosen. During the last few years great changes have taken place in the conduct of coast artillery practice, and methods have been arrived at which, though necessarily far from perfect, have been of infinite advantage in creating in officers and men a greater knowledge of and interest in their work, and in fostering a spirit of emulation among companies. It seems, however, to be generally felt that the time has arrived when still more definite improvements may be considered. There are great difficulties in the way of changes which may affect a large number of units and individuals serving under the very varied conditions which obtain in this branch of the regiment. The endeavor will therefore be made in this paper to suggest such improvements only as may be generally applicable to all cases, details being omitted unless of wide application.

The heading of the subject enforces in the first place the consideration of the question "What are the requirements of actual warfare?" And this entails some inquiry into the circumstances attending war, so far as they concern coast artillery. This inquiry unfortunately is connected with matters of rather wide scope, on which very diverse views are held. The truth of the following passages is exemplified almost daily:—

"Coast defense may be treated from many points of view * * * yet the great principles of warfare by sea and land remain unchanged and unchangeable. * * * Fixed data, unquestioned deductions from real experience, are generally unattainable and the human mind, craving certitude, readily invests its individual promptings with the sanction of authority. * * * Principles are thus effectually obscured, and matters of secondary importance become the first objects of discussion, while policy drifts or is allowed to be dragged in the train of mere subordinate detail. * * * Coast defense appears to be peculiarly liable to danger of this nature. * * * Standing on the border where sea and land meet it has a dual aspect—naval and military—by which a confusion of ideas is apt to be engendered. Moreover the war record of coast defenses has been little studied, and is intimately bound up with those great lessons

of naval history which are only now beginning to be rightly understood."*

Too broad a view therefore cannot be taken. But space will not admit of a full treatment of the question, so that it will be necessary to quote and apply the conclusions of those who are generally regarded as authorities, or whose views have received authoritative sanction. Reference is invited to their writings for the full arguments by which these conclusions are supported.

II. THE REQUIREMENTS OF WARFARE.

The Conditions of Attack.—

The natures of attack to which coast defenses are liable are broadly divisible into the following classes:

a. Deliberate Attack.
b. Bombardment.
c. Forcing a Passage.
d. Raid.

Blockade is not an attack in the tactical sense. A merely blockading enemy would not afford coast artillery the opportunity for firing a single round.

a. By Deliberate Attack is meant such attack as has for its ultimate object the capture of the fortress. This would only be attempted for the purpose of territorial occupation. In the great majority of cases the object could best be gained by the action of military forces landed outside the sphere of coast defenses. The Deliberate Attack by purely naval forces holds out no hope of success to the assailant. History is full of instances of its failure, while such successes as can be claimed for it have been obtained under exceptional circumstances of a sort not likely to be present in conflicts in which our coast defenses are engaged. Neither by sea nor land could it be attempted unless the attacking power held command of the sea. That it is unlikely that this will be allowed to occur may be inferred from a confidential memorandum with regard to Imperial defense quoted by the Duke of Devonshire in the House of Lords (11th February, 1897):—

"The maintenance of sea supremacy has been adopted as the basis of the system of Imperial defense against attack from over the seas. This is the determining factor in shaping the whole defensive policy of the Empire, and is fully recognized by the Admiralty."

It has been said by an officer of large experience that:—

"Attacks on an enemy's fortified ports across the sea are generally undertaken for naval objects, are practicable only on condition of full naval superiority, and to be effective must assume the form of military operations on shore, supported by a covering naval force to maintain communications."*

With the land phase of Deliberate Attack we are not concerned. But

* "Coast Defense in relation to War," by Major Sir G. Clarke, K.C.M.G., R.E. "Proceedings of R. A. Institution," Vol. xxi., No. 11.

if land attack is undertaken in conjunction with naval attack it exercises a limiting influence on the latter, since owing to difficulties of transport and supply the sphere of attack is much narrowed. As complete command of the sea is a necessity for the naval attack, whether in concert with land attack or apart from it, such an operation could not be undertaken until some considerable time after the commencement of hostilities. Taking into account all the disabilities under which ships labor when engaged with fortifications it is evident that, unless the latter are very weak and disorganized, a strong fleet, heavily armed, and perhaps including specially constructed vessels for bombardment, is a necessity to the assailant. The conflict would be one of many phases, and probably include some of the measures of offense referred to under the remaining headings. If mines existed they would have to be cleared away by countermining, the conditions of which are almost identical with Raid.

b. Bombardment may be either persistent or desultory. Persistent Bombardment could occur only under such conditions of sea power as admit of and with such objects as call for Deliberate Attack, of which it would probably form a part. It need not therefore be considered separately.

Desultory Bombardment of the port or shipping guarded by the defenses for the sake of destruction or moral effect, is perhaps barely possible at any time from the commencement to the close of hostilities, and in any state of sea power; but the advantages to be gained, where defenses are moderately well equipped, appear so very doubtful that its use is highly improbable. In order to produce appreciable effect the ships must anchor. Guns of large calibre, admitting of long ranges and heavy bursting charges, would be required, and an immense expenditure of ammunition would be necessary. Ships carry comparatively few rounds for their heavy guns, and will not risk engagement with hostile vessels when short of ammunition. Neither are they normally provided with the means of employing high-angle fire, by the use of which alone full effect can be given to bombardment.

"It may be safely asserted that no serious bombardment of properly grouped, gunned and garrisoned forts is possible without especially constructed vessels and much preparation. Such a preparation involves complete command at sea. Without this condition the attack is limited in its nature by (1) time; (2) coal; (3) ammunition; and is only likely to be undertaken by a small squadron." *

c. Forcing a passage—that is with a view to operations in interior waters not commanded by coast defenses. This is possible in any state of sea power except where the defenders hold complete command. Where open waters do not exist inside the defenses such an operation

* Silver Medal Essay, 1893, Major R. F. Johnson, R.A., who quotes in this connection Naval Prize Essay, 1892, Journal of R. U. S. Institution, Vol. xxxvi.; and "Attack on Lissa," Lewis, R.E. Occasional Papers. Vol. ix.

could only be attempted under the same conditions as are required for Deliberate Attack.

The American Civil War afforded many examples of forcing a passage, but their lessons are of very little value to us in this connection from the fact that interior waters of any extent are of very infrequent occurrence in the British Empire. Port Phillip alone appears to offer any inducement for such tactics.

Where the attempt is made—if vessels of any size are to pass—it will be by day, possibly immediately after a night reconnoissance by small craft which, if the passage is mined or obstructed, may be sent in to clear it. The ships will steam past at their highest speed and endeavor to avoid all conflict with the forts, probably only using their lighter guns, quick-firing and machine, to pour in as rapid a fire as possible with a view to causing losses to personnel which may impede the service of the shore guns.*

d. Raid—that is a sudden attempt to penetrate the defenses with a view to the destruction of shipping in the harbor or under construction, docks, coal and stores.

Not only can this form of attack be adopted by either side in any state of sea power, but requiring no preparation on the part of the assailant it is to be confidently expected, at ports within range of the enemy's base, not later than immediately after the outbreak of hostilities, and possibly even before they have formally commenced. † Prompt action of this nature holds out the best hopes of success, since the defender on the other hand is less likely to have completed all those arrangements, such as the placing of obstructions, for resisting attack, which cannot be finally effected in time of peace.

The larger torpedo boats are unquestionably the most suitable craft for such undertakings. They are very speedy and can therefore reach their objective in a very short time after leaving the base,‡ and can more easily elude detection and attack, both en route and on attaining their destination. By reason of their light draught they are not confined to the ordinary channels on approaching a port. Their small size and particularly their low freeboard, further aid them in eluding observation, and render them a difficult target. Above all they are comparatively cheap, carry small crews, and can be very quickly built, while at the same time the damage they are capable of inflicting is out of all propor-

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* In corroboration of the above reference is invited to "Naval Attack of Fortifications," Capt. May, R.N., R.A.I.P., Vol. xix., No. 3; "Ships versus Forts," Capt. Jackson, R N., "R.E., Occasional Papers," 1889, p. 217; "Floating Defense," Lieut -Col. Sir G. Clarke, R.E., R.A.I.P., Vol. xxi., No, 10; "The Attack of a Coast Fortress," Major R. F. Johnson, R.A., R.A.I.P., Vol. xx., No. 7: "The Training together in Peace Time of the Garrison Artillery Forces of the Empire," Capt. Nicolls, R.A., R A.I.P., Vol. xxii., No 7.

† "The Attack of a Coast Fortress," Major Elmslie, R. A., Prize Essay 1893, R.A. Institution Proceedings, Vol. xx, No. 7.

‡ "The value of torpedo boats in war time," Comdr. R. H. Bacon, R N., "Brassey's Naval Annual," 1896.

tion to the inconvenience which the loss of even several of them might occasion.* Night or thick weather, or both, offer the best facilities for the attack, during which every endeavor will be made to escape detection by the defense.

It is conceivable that Raid might take the form of landing small parties with a view to destruction on shore, but if this is done outside the range of the sea defenses it must be met by the military precautions usual on land, while if landing takes place inside this area opposition to it would assume precisely the same form as that to torpedo-boat attack. There seems no probability whatever that large vessels will ever be used for purposes of raid where the defense is not utterly disorganized. They can effect no destruction which cannot be equally well carried out, with the help of modern explosives, by smaller craft, while every advantage which the torpedo boat possesses would be sacrificed by their use. There is however this exception: where the attacker has reason to believe that the channel is obstructed to such an extent that the boats will have physical difficulties in effecting an entrance, it is not unlikely that under favorable circumstances an old or specially constructed vessel of larger size may be sent in with them for the purpose of making a breach in the obstructions, sacrificing herself if necessary.*

The nearer a port to the enemy's bases the more liable it obviously is to this form of attack. But no ports, however distant, can be considered free from it, for if out of range of sea-going boats they are still open to attack from smaller types carried by battle-ships and cruisers. Indeed the very fact of their situation at a distance from home may be a source of danger. Submarine cables may be cut at sea before war is declared, and, without intelligence of current events, the first intimation of hostilities may be derived from an experience of this nature.

It has been stated above that Raid is to be expected in any condition of sea power. This is obviously the case when command of the sea is indifferent, or doubtful, or in the hands of the enemy; and until the advent of the torpedo-boat destroyer no argument was required as to the possibility of its use even by an enemy blockaded in his own ports, since the immense difficulty of making blockade so effective as to hem in torpedo boats with certainty was universally acknowledged. But as one of the chief functions of the destroyer is to assist in blockade with especial reference to torpedo boats, it may be well to inquire how far the question has been modified by their adoption during the last three years. Some help is to be obtained from a study of the manœuvres of the torpedo squadron under Rear-Admiral Wilson, V.C., in 1895, one of the objects of which was to test the capabilities of destroyers in this respect. The manœuvres were confidential, and no definite conclusions appear to have been published. Accounts are somewhat contradictory in detail but it is recorded that in an instance where ten torpedo boats with two gun-

* "The value of torpedo boats in war time," Comdr. R. H. Bacon, R N., "Brassey's Naval Annual," 1896.

boats were blockaded in two ports, Wicklow and Howth, by twelve destroyers and two cruisers :—

"The boats at Howth experienced no great difficulty, owing to the darkness, in evading the blockaders, and joining the Curlew at a prearranged rendezvous they effected an entrance into Wicklow."*

Here they remained safe for about thirty-six hours. On the following night :—

"Being again dark and the weather fine the boats endeavored to leave their ports. Five of them were put out of action in the attempt and others were also claimed by the destroyers on less conclusive evidence. No. 94 escaped by a ruse, disguising herself as a destroyer by fitting up an additional funnel."*

"The net result seems to have been that in spite of the blockading squadrons of torpedo-boat catchers (*sic*), the bulk of the torpedo boats appear to have found no difficulty in eluding them, and breaking out of the blockaded harbors."†

So far as can be traced no manœuvres have taken place since 1895 the published accounts of which throw any further light on this question. The following remarks however bear on the subject.

"The object in view, that originally led to the construction of these destroyers, was the annihilation of the smaller patterns of torpedo boats, but it is impossible to doubt that in addition to such work a portion of them must be used as torpedo boats."‡

The lesson to be learnt seems to be that although destroyers may perhaps help to limit the ravages of the enemy's torpedo-boats, once our command of the sea is established, yet previous to that state of affairs, and especially in the very early stages of a war, not only can little if any diminution of such attacks be expected, but there is added to their possibilities the use of the destroyer herself, which will compete on equal terms with the destroyers of the defending fleet in all states of sea power, and whose use shortens considerably the time taken in passing from base to objective, thus making the stroke more sudden, and also, on account of their increased power of keeping the sea and greater coal endurance, largely extending the range of it. It is true that other nations have at present very few of these craft, but as they can be rapidly built this fact does not to a great extent lessen the probability of their employment, at all events in the later stages of a war, at which time their value will be most felt by a blockaded enemy.

It appears then that, as matters stand at present, the menace to our defended ports of torpedo-boats attack is as great at the commencement of war as it ever was, perhaps lessening somewhat as command of the sea is secured, but never disappearing; and that in the event of our opponent constructing destroyers during war, these will again increase the

*"British Naval Manœuvres," Charles Greig, late R.N., Brassey's Naval Annual, 1896.

†"Naval and Military Notes," Journal of the R. U. S. Institution, Vol. xxxix. No. 211.

‡"The Value of Torpedo Boats in War Time."

chances of Raid after a certain lapse of time, by enabling the blockaded fleet to oppose to the blockaders boats of equal power to their own.

The Conditions of Defense.—

The means of defense consist of men and material.

Taking material first, it is composed of the following :—

In charge of and controlled by the Artillery—the guns.

In charge of the Engineers but directed by the Artillery—electric lights, when used as search lights (if any).

In charge of and controlled by the Engineers—electric lights used as fixed beams, submarine mines, and Brennan torpedo.

In charge of the Navy—Passive obstructions by sea of a temporary nature.

Besides which there may be obstructions of a permanent nature, such as breakwaters.

The subject of this essay, however, applies to the guns alone, except in so far as the influence of the other agents of defense is so intimately associated with theirs as to necessitate joint consideration. In this connection the following passage is noticeable :—

"The breakwater is the only unanswerable argument to a torpedo-boat. Behind it ships are practically secure against boat attack. The only vulnerable point is the entrance or gateway, which is capable of such concentration of defense by gun-fire, booms, and boat-mines, as to make entrance by unsupported boats practically impossible." *

The guns may be conveniently divided into three classes, each having a more or less special application and a somewhat distinct method of fire-control and direction. They are quick-firing guns, high-angle fire guns, and direct-fire guns.

The first two classes need no definition. The third heading is used, for want of a better term, to include all guns not comprised under the first two.

Quick-firing guns of the lighter natures are provided primarily for dealing with very quick unarmored targets, such as torpedo boats, but their use against the unarmored parts of ships at short or medium ranges is also likely to prove very effective. If countermining is attempted they must interfere to prevent it. When mounted for defense against torpedo-boat attack the normal group consists of not less than two guns. The heavier quick-firing guns are best adapted to the attack of unarmored parts of larger vessels.

High-angle firing guns are especially intended for preventing, by deck attack, bombardment from ranges at which the ships' side armor overmatches the defender's direct-fire guns. They are not intended or likely to be called upon to deal with vessels moving otherwise than very slowly. They are disposed in "batteries" of two or more guns, usually in concealed positions.

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* "The Value of Torpedo Boats in War Time."

The direct-fire guns are intended to encounter ships, armored or unarmored, whether anchored or under way, at all ranges within their effective area. Their disposal and grouping vary very considerably. Some are, or are to be, furnished with special case-shot for use against torpedo-boats where channels are narrow and quick-firing guns not available. The lighter natures belonging to the armament for general defense are chiefly applicable to the defense of land fronts, or the resistance of attempts at landing, but might also be used as auxiliary to the primary armament. No definite system of fire discipline is laid down for these. Machine guns, however, are likely to be found mounted in conjunction with quick-firing guns,* and would then presumably conform to the fire tactics of the latter.

The men for manning the above defenses consist of the following :—

For the guns—the Royal Artillery (whose numbers would be increased in war from the reserve), together, at home with the militia and volunteer artillery, and at some stations abroad with local artillery, and occasionally infantry.

For the other defenses—the Royal Engineers; with the exception of the temporary obstructions, which are managed by the Royal Navy.

Recapitulation and Deductions.—

The elements of attack and defense, together with the circumstances attending their use, may now be considered collectively, and from these certain general requirements may be deduced as being those of actual warfare. The endeavor has been made in the foregoing paragraphs to submit as briefly as possible the fundamental considerations on which an inquiry into the best methods of conducting practice in accordance with the requirements of war must be based. But at the same time, in order to fully support the proposals which it is desired to advance, it has been necessary to carefully guard against any lack of clearness or completeness in the premises (which have not always received due acknowledgment) so that further abbreviation appeared inadvisable.

The table on the next page, which embodies in a short form the views and facts already put forward, will probably help to make clearer the general conclusions arrived at.

These conclusions are as follows :—

(1.) One form of attack—raid—stands out prominently from the rest as being under all circumstances most probable—even most certain. The best means of meeting it, viz., with the lighter quick-firing guns assisted by obstructions, and at night electric light, is equally clear. It is therefore obvious that before and above all the most pressing demand made by the requirements of war on the conduct of coast artillery practice is for the provision of adequate opportunities of practically training all ranks in the use of these weapons.

(2,) With regard to the other possible forms of attack we find on ex-

* Amendments 1896, to G. A. Drill, Vol. i., 1895, "Service of quick-firing guns for defense against torpedo boats."

TABLE.

Nature of Attack.	Probable Object.	State of Sea Power.	Class of Vessels likely to be used.	Probable Time.	Means of Defense applicable.	General Remarks.
a. Deliberate Attack.	Ultimate occupation of territory.	Command necessary to the attacker.	All existing classes. Perhaps specially constructed vessels.	Day, but may be continued by night.	All guns which can bear (mines and Brennan torpedo, perhaps obstructions).	Includes Persistent Bombardment. "Means of Defense" refers to naval attack only. Purely naval attack unlikely except against very inefficient defenses. If in conjunction with land attack objective must be fairly close to enemy's base. Cannot occur at beginning of hostilities.
b. Bombardment.	Destruction, or to produce moral effect.	Barely possible in any state.	Battle-ships, cruisers, and gunboats.	Day or night.	High-angle fire guns, heavy direct fire guns.	Refers to Desultory Bombardment only. An unlikely form of attack by our adversaries.
c. Forcing a Passage.	To operate in interior waters.	Possible in any state except when defender holds command.	Any vessels, but probably fast ones.	Day.	Direct fire and Q. F. guns (mines, Brennan torpedo and obstructions).	Applicable to very few of our coast defenses.
d. Raid.	Damage to shipping, docks and stores.	Probable in any state, particularly when indifferent or doubtful.	Torpedo-boats and torpedo-boat destroyers, perhaps accompanied by a larger vessel for breaking through obstructions.	Night. In thick weather by day or night.	Quick-firing guns, machine guns, and heavy guns firing special case (obstructions and boat mines).	Applicable to all defended ports in proportion to their importance and nearness to enemy's bases. May occur before, almost certain immediately after, declaration of war.

"Means of Defense" placed in brackets are not under Artillery control.

amination that each is subject to qualifying conditions, relating to maritime power, expediency, or opportunity, which renders its employment by our opponents improbable. The means of defense corresponding to such attacks become therefore of relatively minor importance. But it does not follow that the necessity for them disappears; the following extracts clearly indicate their scope and uses:—

"Between permanent loss of the command of the sea, and the possibility of a temporary reverse which might expose some portion of our coasts to the risk of invasion, there is a very wide difference. As far as I know no government has ever contemplated—certainly this government has not—the neglect of any precaution which might tend to the diminution of such risks."*

"Our coaling stations should be able to stand alone against any attack which is likely to be directed against them during the temporary absence of the fleet."†

"Coast defense in the narrow sense demands merely that purely naval attack shall be rendered hazardous. If this condition * * * is not fulfilled, results important, though restricted, can be attained by purely naval action."‡

III. METHODS OF PRACTICE ADVOCATED.

Quick-Firing Guns.—

12 pr., 6 pr. and 3 pr. Q. F.—To obtain service conditions the most important requirements of practice from the lighter quick-firing guns are that:

1. It should take place from a group or groups, each consisting of not less than two guns.

2. It should be carried out principally by night.

3. It should be possible to run two or more targets at the same time.

4. The targets should be capable of a speed of not less than 20 knots.

5. The time of starting the targets should be unknown to the group beforehand.

6. At night practice the targets should be out of view until they are started.

7. The targets should have as far as possible the appearance, and some approach to the dimensions (in freeboard at all events), of an actual torpedo-boat.

8. The range should be a clear one, so that interruptions which would not occur in war may be avoided.§

These requirements may appear at first sight formidable, and difficult of attainment. It is hoped, however, to show that the difficulties are not so great as they seem.

Taking into account the very early period of the war at which, as we have seen, quick-firing guns will be called into play, there can be no

* Speech of the Duke of Devonshire in the House of Lords, 11th February, 1897.

† Speech of the Marquis of Lansdowne in the House of Lords, 4th February, 1897.

‡ "Coast defense in relation to war."

§ Report of School of Gunnery," 1896, Part 1, paragraph 25 (e).

doubt that they can be efficiently manned only by permanent artillery, either Royal or local. Militia and volunteers will probably be scarcely mobilized when the first raid takes place, much less will they be capable of making the best use of weapons requiring on the part of their commander so much smartness, readiness and self-reliance, and of the detachments such skill and alacrity. These qualities spring from a man's intimate acquaintance with his comrades, and familiarity with his weapon and his own power of using it. They can only be acquired and maintained by careful and continuous instruction, drill, and *practice* together of all ranks, both by day and night, opportunities for which are necessarily lacking to the auxiliary artillery. So far as these guns are concerned therefore we need consider the practice of the regular artillery only. It is necessary to insist on this point, as the suggestion has been made that these guns at home should be allotted on mobilization to the volunteers.* This would greatly increase the obstacles to carrying out practice under service conditions.

The first and perhaps the greatest difficulty occurs in connection with night practice, a requirement of the most urgent importance. This would be experienced in the highest degree at precisely those stations—large harbors and naval ports—where quick-firing guns are of the greatest value in defense. On the other hand, the extremely few places where night practice might be found possible would probably be in very shallow and unfrequented waters, devoid of all the peculiar features of sea and land belonging to ports and harbors, and little likely to be approached by actual torpedo boats. Practice if confined to such localities would unavoidably tend to degenerate into mere shooting at a target. The benefits to be gained by local knowledge of channels and familiarity with the appearance of torpedo boats in motion, by day and night, would be in danger of being lost sight of.

It is therefore proposed that practice should be divided into two distinct portions, as follows:—

a. Blank practice, to be carried out at actual torpedo boats, and from the guns which would be manned in time of war, at each station, where quick-firing guns are provided.

b. Shell practice, to be carried out at some place affording opportunities for day and night practice at quick targets over a clear range.

a. The object of this practice would be to accustom officers and men to dealing with actual torpedo boats; to prepare them for the tactics which raiding boats are likely to employ; to exercise them in picking up and laying on boats by night under service conditions; and to teach them the influence exerted by the local conditions of their particular port. The coöperation of the naval authorities is a necessity for this form of practice. There has hitherto been considerable difficulty in securing such coöperation, but a juster appreciation by each service of

* Proceedings of R. A. Institution, Vol. xxii., No. 7, p. 356.

the other's wants and duties is beginning to be felt. Artillerymen no longer regard their guns as the main factor in resisting invasion, while most naval officers are prepared to acknowledge the usefulness of coast defenses as a protection from raid. There are indications that joint operations of the kind proposed would not meet with much opposition from the navy. They have been strongly recommended by Lord Charles Beresford in a recent magazine article* as likely to be of benefit to both services. There are probably few, if any, stations at home or abroad provided, or to be provided, with quick-firing guns where they could not take place at some period of the year. Indeed it is believed that a scheme of this nature is at the present time receiving consideration, and may be definitely settled before this essay is read. In one station at least manœuvres of a similar kind have already been carried out by private arrangement.

It is almost superfluous to add that electric lights must be available, and such obstructions as would be used in war either placed in position or assumed to exist.

b. The above operations however would be of little value without the addition of actual shooting.

The "Instructions for Practice Seawards, 1897," contain a notable innovation, viz., a scale for the issue of torpedo-boat targets to various stations. The ultimate adoption of these targets can therefore be accepted as a certainty, and this goes far towards simplifying the suggestions which it is intended to offer with regard to shell practice. It is assumed that the means of running them will be similar to that which has been for some time in use successfully at Shoeburyness, viz., a winding engine on shore and a wire cable, led over bollards. Also that the speed will not be less than twenty knots.

There are, however, objections, which it is submitted are well grounded, to the proposed distribution of these targets at home. Some of the stations to which they are allotted are notorious for the foulness of their ranges, and none it is believed afford any facilities for night practice. It will surely be acknowledged that if this is the case, and if blank practice can take place as suggested under (*a*), it will be better, instead of attempting to carry out shell practice under artificial conditions at these stations, to send details from thence to one specially selected place, where obstacles of the kind referred to are not present. Such a place would thus become the practice camp for quick-firing artillery, and in selecting it accessibility should be kept in view. The saving effected by unification of plant and decreased cost of maintenance would probably help materially to lessen the cost incurred for transport, without reckoning the gain in efficiency.

Discussion as to the suitability of any particular place for the purpose suggested hardly comes within the scope of this essay. It may be noted

* "Urgent Questions for the Council of Defense," Nineteenth Century, February, 1897.

however as a proof that the suggestion is practicable, that failing other more suitable places the desired facilities exist at Shoeburyness,* where the power is given of closing the foreshore entirely at low water, and to all but trading vessels at high water. Targets for night practice would probably have to be run, as at present, on wheels over the sands, but this, supposing the dimensions and appearance of the targets to be suitable, need detract but little from the value of the practice.

The requirements not already dealt with, viz., 1, 3, 5 and 6, present no difficulties. The reasons for them are obvious when we consider the nature of the target likely to be offered in war, viz., several boats appearing at high speed, successively or in a swarm,† and without the least warning, in the narrow area illuminated immediately in front of the obstructions. The difficulties attending fire direction in such a case can hardly be over-estimated. Without previous experience of similar conditions failure must ensue.

In addition to the eight most important requirements which have been already mentioned, the following points deserve notice:—

At least two groups should be available for simultaneous practice. Where a port is liable to attack on the scale instanced above some previous understanding between groups as to the selection of target would appear to be a necessity. This procedure should be rehearsed at practice.

The scale of ammunition should be ample. It does not follow however that much, if any, extra expense need be incurred on this score. The regimental practice funds are available for drawing on, and a very slight revision of the scale of issue for heavy guns might yield a considerable increase.

Illuminated sights should be provided for night practice.

The target should be capable of recording hits.

The arrangements made for winding in the target should admit of the direction of its travel being varied. This only entails the provision of suitable bollards.

The engine employed should be so constructed or placed as to give no warning by noise of the starting of the target.

Electric lights should be provided on the scale likely to exist at important harbors in time of war.

The position of supposed obstructions should be indicated by marks or buoys.

It is taken for granted that cordite would be employed. The term "quick-firing" applied to guns firing black powder is a misnomer.

If the above recommendations were carried out almost infinite variation of the tactical conditions would be possible, with a view to illustrating the requirements of different stations.

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* Bye-laws, Shoeburyness Ranges, 1895. Report of School of Gunnery, 1896, Part 1, paragraph 22.

† Page 11 "Amendments 1896, to G.A.D.," Vol. 1, 1895.

It should be borne in mind that the service conditions under which these guns will be used on land are different from those that obtain on board-ship. Confusion of ideas on this matter has sometimes occurred. Each ship must protect herself, and consequently her guns are devoted in the first place only to such boats as are attacking her in particular. These must come to fairly close range in order to have a good chance of disabling her, and the nearest boat at any time is that to be most feared, and on which all fire must be concentrated. The case is different with shore guns. Those boats which have the best chance of getting past are the most dangerous, and these may be the most distant from the guns, which they will endeavor to avoid instead of approaching. Selection and indication of target by the gun group commander become therefore matters of the most vital importance.

Shell practice has so far been treated of with especial reference to home requirements, which appear capable of satisfactory fulfillment. Abroad the difficulty is greater. It is doubtful whether such facilities as are desirable can ever be afforded without going to the expense of providing special practice batteries at every station. The establishment of a regular Q. F. practice camp at home, which could be kept at work throughout the year, would however be of great value, and officers and men who had attended it would gradually permeate the garrison artillery. Besides it seems reasonable to suppose that a few gun group commanders and gun captains might be sent home at intervals to profit by its advantages. A similar course has been pursued in the training of other experts—master tailors for example, whose vocation is hardly of equal importance.

It is not intended to suggest that even at home whole companies should attend the camp. The attendance of a certain number of officers and men should be authorized for each station, the number depending on its importance and armament. The selection of these should be left to the officer commanding. In the first place those details should be sent on whom would fall the duty of manning the guns in war, and the practice carried out by these should be most thorough. After making provision for them it would be advisable if possible to secure the attendance of a reasonable number of other officers and men, each company at home sending a due proportion, say once in two or three years. The numbers to be accommodated in the course of a year would be a matter for consideration and arrangement, but the whole quick-firing manning details from any one station should be sent, as far as possible, intact and together. It is believed that the benefit accruing to the garrison artillery from the adoption of some such scheme as has been outlined would be incalculable, and to the subaltern of that branch in particular, in whom at last would arise the hope of undivided responsibility and independent command.*

There remains to be mentioned practice with aiming rifles and tubes.

* See Report of School of Gunnery, 1896, Part 1, paragraph 188.

These are especially important adjuncts to quick-firing guns, in the service of which individual skill in fire direction and laying has such an extensive influence. The strong appreciation of their advantages expressed in the last report of the School of Gunnery * encourages the belief that their approval for land service will not long be delayed. The navy has had them for years.

Practice with aiming rifles (.45 inch calibre) at a small target moving over the actual fire area of the guns should be carried out by the proper detachments once a week. Ranges up to and not greater than about 500 yards will probably be found most suitable, as the arc passed through by the target in a given time will then be a fairly large one, and if the size of the target is proportionately decreased the difficulties of ranging and laying on a quick target of ordinary size at longer ranges will be illustrated with some approach to truthfulness. Such a target, about four feet by one foot six inches, if properly made, can be towed at a sufficient speed by a rowing boat of the kind generally held in artillery charge at coast stations.

The aiming tubes (.23 inch calibre) should be used in connection with a miniature range giving facilities for running a small moving target. Part of the path of the target could be lit up at night by a suitable oil lamp with bull's-eye lens, in imitation of the electric light, and the target, of a size proportionate to the length of the range, being passed across the lighted belt, a fair resemblance to the service conditions of vision would be obtained. A range of this description is in use at the Royal Naval School of Gunnery at Whale Island. The best length for the range is about twenty-five yards. With this length the target should be a broadside model of a torpedo boat, on a scale of about $\frac{1}{60}$th. It would then appear of the same size, when viewed from the gun, as would the real boat at a range of 1500 yards. The range should be accessible to all N. C. officers and men during their spare time. They would probably need little encouragement to use it, but the offer of small prizes periodically, which could be obtained from company or regimental funds, would perhaps further conduce to the bringing forward of the best layers, who would be available as understudies to the proper gun captains, and to replace waste among these due to transfers, discharges, etc. Any brick wall of average height forms an efficient butt; both traverse and elevation may be limited mechanically so that no shot can miss it. The gun used might be one of those belonging to the armament, a 6 pdr. for choice on a light temporary cone or pivot. It would be better however to use an unserviceable gun or a dummy, properly weighted and balanced, and similarly mounted. The armament guns need not then be interfered with. The expense of such a range should be very small.

If automatic sights are ultimately introduced for quick-firing guns, the effect will be to take fire direction to some extent out of the hands of the gun group commander. Their application to groups of guns is yet untried,

* Report of School of Gunnery, Part 1, paragraphs 20, 21, 188.

and the advantages of it are perhaps open to question. If adopted, however, their use alters none of the principles which govern the conduct of practice, though details may require slight modification.

6 inch and 4.7 inch Q.F.—These guns, not being intended for use against torpedo-boat attack, are unlikely to be wanted at night (see table). Should however a larger vessel be employed to clear a passage for torpedo boats through temporary obstacles, if conveniently sited their effect would be useful. But a vessel risked for this purpose would almost certainly be old and therefore slow, and an easy target on this account and by reason of her size. Practice for them does not call for the special measures necessitated by the circumstances attending the use of the lighter guns. Their special province is the attack of the unarmored parts of larger vessels by day. Some of these might be fast ships, so the quickest targets obtainable should be used.

No special scheme of fire discipline is laid down for these guns, but it is assumed that, for the sake of rapidity of fire, that authorized for the smaller natures will be followed. Practice from aiming rifles and tubes should therefore be carried out on the same lines as for the other quick-firing gune, in addition to the ordinary practice, with a view to instruction in ranging and laying. Aiming rifles and tubes for the 4.7 inch are approved.

High-Angle Fire Guns.—

To obtain service conditions for practice from these is not very difficult. Their targets in action would be vessels at anchor or moving slowly. Rapidity of fire is not so important as accuracy, and this they are able to attain by the help of the position-finder. The chief object of practice is therefore to train the battery commander in fire direction and P.F. operators in observation of fire.

The targets used for practice should be both anchored and drifting. No special form of target is authorized, and those generally used do not record hits or admit of their being readily estimated by the range party. It is useless to trust to the position-finding operators for this; their estimate of error in range is inclined to be optimistic. A real record target would be an impossibility in any but the calmest weather, and unwieldy at the best of times; but a fair approach to one could be obtained by lashing loosely together four light spars of convenient length in the form of a rectangle, bracing them loosely with similar spars diagonally and attaching a float carrying a bannerole to each corner. This would stand any ordinary weather, and a range party, suitably placed on a flank, would be able to judge of the effect of fire with regard to range, while observation for line could be carried out from a position in the line of fire. From the joint observation of these two parties hits could be detected.

As the power of indicating target by the fire commander to the battery commander would be a matter of some importance, this should be

practised, two or three targets being put out for the purpose and fire turned from one to another.

There seems little necessity for night practice, except with blank ammunition to test apparatus. Ships certainly might carry on bombardment by night, but only do so with the slightest hope of effect when they had commenced it by day, and obtained bearings on which to continue it. In this case their positions could be plotted on the chart of the position-finder, and fire maintained with the same ease as by day.

High-angle fire guns do not suffer from foul ranges in the same degree as direct-fire guns (reference to which will be made presently), owing to the sites in which they are usually placed, their long ranges, and the absence of ricochet. There is also less necessity for quick continuous fire from them. No aiming rifle has yet been introduced for them, but such an apparatus, on similar lines to the Italian "tube-cannon" of 2.78 inches calibre, would be of advantage if of suitable design and firing cheap ammunition with a variable powder charge.

Direct-Fire Guns.—

These are of so many different natures, so variously mounted, sited, and grouped, that practice from them can be only very generally dealt with. There are, however, certain principles which are of universal application, or nearly so. Local arrangements should be based on these.

The heavier guns are primarily intended to resist deliberate attack, but their use in the case of desultory bombardment or forcing a passage must be contemplated. In many places they form the sole means of defense against bombardment. It has been shown, however, that each of these latter forms of attack is unlikely for different reasons, and that deliberate attack could not take place in the early stages of a war, or even afterwards, unless command of the sea was lost to the defenders. It is therefore in assisting to man these guns, at which the details will probably have plenty of time after mobilization to settle down and become accustomed to their duties, that auxiliary artillery can be of the greatest service. But in order that there may be no unpreparedness for emergencies, a few of the most powerful guns, at any place which is liable to bombardment at the beginning of a war, should be manned by regular artillerymen. This is especially desirable if no high-angle fire guns are mounted. If well served they would be quite sufficient to deter an enemy not thoroughly prepared for this form of attack, which at such an early stage is impossible, from prosecuting it with any vigor. Similar precautions are necessary in the case of defenses liable to the third form of attack, but in this case the guns capable of the most rapid service would be those most wanted. It seems, therefore, that both the regular and auxiliary artillery should train and consequently practice with these guns, the former in addition to all other guns, the latter exclusively.

That curse of coast artillery practice, foul ranges, is more felt with these guns than with any others, on account of their large danger zones, due to possible ricochets. No other service, when practising the use of its own weapons, suffers in a similar way. It is as though a battalion of infantry at field firing were compelled to await pauses in the traffic of a thoroughfare which the military authorities were powerless to close. No practice can possibly be carried out "with a view to the requirements of actual warfare" until such conditions are abolished.*

There are two possible solutions of the difficulty, viz., practice batteries in unfrequented waters, and by-laws under the Artillery Ranges Act. A judicious combination of the two might effect great improvements.

Practice batteries should be constructed at as many stations as possible, and should be in waters fairly clear of shipping, which are generally to be found adjacent to a fortress, but for obvious reasons do not exist in front of its defenses. They should be armed with from two to four guns of modern type, arranged so as to be capable of working as two groups under a battery commander. The most suitable gun appears to be the 5-inch B.L., of which it is believed a large number on Vavasseur mountings are lying idle in the hands of the Admiralty. The ammunition is cheap, consequently a comparatively large number of rounds would be available. Even should the scale be reduced, ten rounds fired under such an approach to service conditions of continuity as would then be possible are worth twice that number expended in driblets, as is too often the case now. The batteries should be available for use by militia during their training, and by volunteers at all times. By their help a true understanding of what "fire discipline" implies could be instilled into the minds of all branches and all ranks of the coast artillery.

But it would not do to rely on such practice alone. At all stations, if possible, in any case at all important fortresses, power should be granted to close the ranges during certain restricted periods; for example, for any four days during the months of August and September, and for not more than four hours in any one day—the time of year being of course chosen so as to interfere least with the special pursuits of the particular locality, and, if possible, to coincide with the training of the militia and the annual camp or practice of the volunteers allotted to the defenses, who should undoubtedly be present. All works should be manned simultaneously, and as completely as the numbers available allow. The greatest difficulty in carrying out service practice (in its true sense) would thus be removed. Even if such facilities for practice were afforded once only in several years a great stride would have been made towards efficiency. These remarks apply equally to practice from the heavier quick-firing guns, which together with high-angle fire guns should be included in the combined practice. During the practice the

* See Report of School of Gunnery, 1896, part 1, paragraph 25 (e).

troops should be quartered, allotted to guns, supplied, and equipped as they would be in war. In drawing up schemes for practice, determining courses of targets, etc., the tactical conditions of the particular locality and the natures of attack to which it is most liable should be kept in view. Such practice alone can thoroughly test the fighting organization of the defenses, the communications, etc., or give the fire commanders proper opportunities of rehearsing their duties. It is more than possible that some of those refinements of detail which have rather tended to increase and multiply in the artificial atmosphere produced by present conditions would disappear under its healthy influence.

Where Forcing a Passage is a possible form of attack the use of "running past points" should not be neglected, either in the practice battery or in the works themselves. For this very quick targets are a necessity, and two very light marks representing the bow and centre of a ship, towed with coir rope by a powerful tug, should be employed.

A battery commander should never at any practice be hampered with responsibility for the safety of the range if it can be avoided. He cannot attend properly to this and efficiently direct his fire at the same time. Every effort should be made to detail a special safety officer to each battery command.

The above proposals are put forward in the belief that they afford the only real solution of the most serious difficulties attending practice from heavy guns, and would lead to a better understanding of what are service conditions, and to greater smartness and rapidity of fire—results much to be desired. One thing is certain, ordinary practice with constant long interruptions between each few rounds has often a most evil influence on even the best men, and leads to slovenly habits and general slackness.

Aiming rifles should be supplied, where heavy guns are mounted, not singly but by groups, and if possible to all the groups of at least one battery command, for choice that which has the clearest range. Where no battery command has a clear range they should be supplied for all the guns of a practice battery. In either case the frequent use of them by all the artillery in the command should be facilitated as much as possible. With the 1-inch rifle observation of fire is fairly easy over moderately smooth water up to about 2000 yards, and with the .45-inch to about 1000 yards. These distances permit the use of range-finders or position-finders in the ordinary manner, and for all cases of laying, with the exception that the .45-inch rifle, not being adapted for electric firing, precludes the use of P.F. case III. As, however, this is only furnished for R.B.L. guns, B.L. guns below 6-inch and R.M.L. guns below 9-inch, no inconvenience results. When using case I. a range table for the ammunition in use is required, by the help of which in conjunction with the range table for the service charge the correct graduation at which to set the sights can be obtained. It would be better, however, to have removable range strips properly graduated for the rifle ammunition.

When using case II. or III. a scale of quadrant elevation must be worked out, from the range table for rifle ammunition, in the ordinary way and temporarily attached to the mounting. The target should be, as recommended for quick-firing guns, and for the same reason, a small one at comparatively short ranges. Owing to the small dangerous distance of the ammunition, practice is little liable to interruption from a foul range. Fire direction and fire discipline of a battery command can thus be practised under conditions which will allow of very valuable experience being gained by battery commanders, position-finding and depression range-finding operators, gun group commanders, gun captains and layers, and accustom all these to working together.

The use of aiming tubes (.23-inch calibre) may be possible in some situations, and if so they should be taken advantage of to train layers, in addition to the practice with aiming rifles. The target should be arranged on similar principles to that advocated for quick-firing guns, but no butt or artificial light will as a rule be necessary.

Those heavy guns (if any) which are provided with special case-shot for repelling torpedo-boat attacks, in the absence of quick-firing guns, should be practised from under as near an approach as possible to service conditions, *i. e.*, by night and at a quick target. Paper shot or blank would probably have to be used, and the arrangements might be similar to those for blank practice from quick-firing guns.

The only possible use, as coast artillery guns, of the "armament for general defense" would be in repelling landing attacks. They should be occasionally practised from under this idea at a target moving towards the shore.*

The practice of machine guns over sea ranges should for the same reason be carried out at a similar target, with the exception of those grouped† with quick-firing guns, which should be practised from under the same conditions as quick-firing guns.

Classification of Practice.—

The following classification of the proposed systems of practice is advocated :—

a. Company elementary practice.
b. Company service practice.
c. Station service practice.

a. This should consist entirely of practice with aiming rifles (1-inch and .45-inch calibre) from the guns mounted in the defenses. Where, however, it is very difficult to obtain a clear range for these, aiming rifles might be used in the guns of the practice battery ; but the practice would then be less valuable as a help to testing means of range-finding, communications, etc., and accustoming details to the use of these as they would exist in war. Owing to the cheapness of the ammunition a large

* See Report of School of Gunnery, 1896, Part I., paragraph 188.

† Page 9, Amendments 1896, to G.A.D., Vol. I., 1895.

number of rounds should be available, and the practice spread over the entire year. No employment should be allowed to prevent a man of the regular artillery from being present at such practice at least once in every three months. Each man should attend practice as far as possible with guns similar to those to which he would be detailed in time of war. The use of service ammunition for elementary practice is a waste for which there is no occasion now that aiming rifles are approved. Every round should be carefully saved for the more instructive service practice.

Whether detailed to man quick-firing guns or not, a certain proportion of every company—say a subaltern and twenty men, specially selected—should be trained to these guns, and practice with aiming rifles from them.

b. This would consist, for those details told off to quick-firing guns at home, of the practice at the Q.F. practice camp already recommended; for details abroad, of the nearest approach to service practice that the locality and appliances available would allow. Such details should be obtained by very careful selection of the smartest officers and men in the company which is charged with furnishing them.

In companies, or parts of companies, told off to the other guns it would consist in the case of high-angle fire guns of practice from the guns themselves; in the case of the direct-fire guns of the practice from the practice battery for the reasons already stated. In all practice under this heading every attempt should be made to approach service conditions. Some definite tactical idea, based on the forms of attack to which the defenses are liable, should be followed. Casualties to men and material should be frequently practised. The practice should never be interrupted to correct errors of drill, unless waste of ammunition is likely to ensue. They should be noted and pointed out afterwards, except when they occur frequently, in which case practice should be stopped altogether, and drill substituted. Every endeavor should be made to obtain continuous, rapid and accurate service of the guns.

Competitive practice should be included in this class, and carried out with the same regard to service conditions. In view of the immense importance of Q.F. practice it would be well that, in each alternate year at least, it should take place from quick-firing guns. This would perhaps be difficult at present, but the difficulties will decrease as the guns for which money has been voted in this year's supplementary estimates become available.

At other times the practice batteries which have been advocated should be used, or, failing these, practice should take place from the guns having the clearest range.

The above procedure would help to assimilate the conditions of practice at different stations, and might render possible a comparison of companies on a much larger scale than is practicable at present, a result which would greatly increase the keenness of all ranks, and tend to further emulation and improvement. With a view to this, and also to

approaching more nearly to service conditions, a battery commander at competitive practice should be given a certain number of rounds and allowed a certain fixed time, only barely sufficient, in which to expend them, and should not be hampered by being tied down to particular "orders of fire," but allowed to use his judgment in the selection of these, one of his most critical functions in action which is put to no test under the present scheme. This originated before the word "ranging" was uttered in connection with heavy guns, and as it stands is rather too artificial, tending to cramp a good battery commander and a smart company, who gain no credit for quick ranging and rapid fire.* The system proposed has worked thoroughly satisfactorily in the field artillery, and steadily increased its rate of fire.

It apparently has no inherent drawback preventing its application to coast artillery.

c. This would comprise the combined practice already referred to, carried out under service conditions from all the guns, except the lighter Q.F., mounted in the defenses, or from as many of them as could be manned, on the days set apart for practice under the proposed by-laws. This practice would correspond to the present station and regimental practice, and to the ammunition allowed for it should if possible be added that sanctioned for position-finding practice, courses being so timed as to enable them to complete instruction in time to take their places at the instruments. As at company practice tactical ideas should be followed, but in this case on a more extended scale. The blank Q.F. practice already mentioned would be included under this head, and should if possible take place at the same time, but need not necessarily do so.

IV. CONCLUSION.

The endeavor has been made to put forward no proposals but such as it is believed are both practical and practicable, and would entail little or no additional expense. More could easily be said on the subject of coast artillery practice, and details which will no doubt suggest themselves have had for want of space to be left unnoticed. But when guiding principles are once acknowledged details are easily filled in. The great danger lies in the tendency, often apparent, to elaborate details first and then adapt principles to them. For this reason it seemed prudent to consider somewhat carefully the possibilities and probabilities of war. Such consideration brings out most clearly the liability of coast defenses to one form of attack—raid—and the consequent paramount importance of practice from quick-firing guns. This is a matter of the very greatest urgency, not only to coast artillerymen, but the country at large, which at present without doubt is not getting full value for the money spent on these guns for land service, inasmuch as there is not

* The modifications in "Instructions for Practice Seawards, 1897" (published since this was written), corroborate the views expressed as to allowance of time and ammunition. The compulsory use, however, of certain "orders of fire" is still ordained, so that a B.C. is precluded from proceeding to "salvo fire" (which should rightly be used as soon as ranging is completed) until after his eighth round. Such a limitation is opposed to war conditions.

one man of those in whose hands they would be if war came to-morrow who has been or can be under present circumstances fitly trained to use them. When war comes there will be no time to make up for lost opportunities in this respect. For each individual concerned in the service of these guns there is no more proper motto than that which heads this essay—"Semper paratus."

CASUALTIES AND THE LAWS WHICH INFLUENCE THEIR NUMBER, INCIDENCE AND DISTRIBUTION.

By Surgeon-Captain MELVILLE, A. M. S.

(*From the Journal of the United Service Institution of India.*)

THE incidence of casualties in war and the laws which govern their number and distribution form a subject which cannot fail to be of interest to every officer and man, combatant and non-combatant, whose fate it may be to have to undergo the ordeal by battle, and to none perhaps more than to those whose life on service will largely be regulated by those laws, and who may in addition be unfortunate enough to furnish in their own proper persons examples of their working. There seems to be a popular and widespread impression, not in any way as far as I can see supported by facts, that the number of casualties must in some way depend on the potential destructive power of the weapons used by the belligerents. Were this so, we should expect to find that in proportion as that potentiality has increased, as it undoubtedly has by leaps and bounds, in the last 30 years, so should the ratio of losses to the strength of armies have increased. To judge by statistics this has by no means been the case. Let any one for instance take the losses incurred by the American troops in the North and South war and compare them with those recorded in the Franco-German War, and they will see at once that, so far from casualties having increased in any way proportionally to the increase in potential destructive power of the weapons used in the latter war, as compared with those used in the former, the tendency has been rather the other way. Compare for instance the casualties in the battles of Gettysburg and Vionville-Mars-La-Tour, 33 per cent. in the former and 9.75 per cent. in the latter, not to speak of the less bloody conflicts of Orleans and Spicheren and the fact at once becomes apparent. Statistics, however, are as we all know, proverbially unreliable: is there then no way by which we can arrive at the fundamental principles that govern the problem? Let us reduce the question to its simplest terms.

What is a war or a battle in fact but the attempt of A to get possession of or to retain something that B has, or wishes to get. And the amount of suffering bodily and mental which either A or B is willing to undergo for the attainment of their respective objects, is the measure of the value which they attach to that attainment. It is, to use a metaphor

that should appeal to us in India, the expression of the exchange value of pain and profit in the minds of each. If the profit be great then each will be ready to suffer much pain, and in proportion as pain is a trivial or a serious consideration to either, in such proportion will they be willing to suffer much or little to win the profit. Let us expand this idea. If an army be composed of men to whom by race, by education, or by reason of the hazardous nature of their daily lives, a violent death is a familiar idea, or even as in some cases an object to be, if possible, achieved, to such an army a proportion of loss, which would break the spirit of an army composed of less hardened savages, would appear comparatively trivial. Our own experience in the Soudan and Zululand gives us countless instances of this. On the other hand if the object fought for be of a high and imperious necessity, such as civil or religious liberty, the meekest and most timid of races will fight to annihilation for the attainment of that object and for the preservation of that liberty. Of this also, history furnishes numerous instances. And between the two extremes, the ferocity that throws away life cheerfully in a trivial cause, and the despair that animates resistance to the death in the most timid, there is an endless series of gradations which tend in varying degree to affect the proportion of casualties to the number of fighting men. What is the evidence of history? What are proverbially the most bloody wars? Civil and religious wars. Who are proverbially the most reckless fighters? Religious fanatics. Be they Cromwell's Ironsides or Afghan Ghazis, the men who fight for what they look on as their chance of eternal salvation, have always been the most ready to risk annihilation in the cause. And after these come men to whom defeat means racial destruction, or loss of civil or political liberty. These fight for all that makes life worth having in this world, and they fight with corresponding sternness. Casualties will then in great part be governed by the greater or less callousness to suffering of the belligerents, balanced by the greater or less importance which they attach to the object they are striving for. The callousness may arise from the constitutional recklessness of the savage, the doggedness of the Anglo-Saxon, the *élan* of the Celt, the unreasoning obedience of the Slav. The importance they attach to the object fought for will depend on the influence its attainment or loss will exercise on their future lives, or the subsequent career of their nations. The resultant effect will be in proportion to the balance of these factors. In great part, but only in part. These factors determine indeed not so much the total casualties of a war or battle, as the breaking strain of the armies engaged. Each army will fight on till its breaking strain measured as above is reached, then it will give way, and in giving way will lose not only its power of defending itself, but to a greater or less extent its power of injuring its opponent. The breaking strain therefore of one or other army being reached, the losses of the victor will to a great extent cease, those of the vanquished will continue to a point governed only by the cruelty and powers of pursuit of the victor. For a civilized

army to be defeated by a savage one, means a far greater slaughter than the reverse case.

So far, the question of armament has not arisen, and in fact the theory that the potential destructive power of weapons must be a ruling factor in the production of casualties can be readily disproved by *reductio ad absurdum*. The potential destructive power of any ballistic weapon varies directly with the rapidity with which it can be discharged, the range to which it can propel its missile, and the portability of that missile (I am referring here only of course to those weapons which form the personal armament of the soldier). The potential destructive power of the Martini rifle of the Turks in 1878, was obviously far greater than that of the muzzle loader of the Napoleonic wars. And yet the greatest losses it was able to inflict were 30 per cent. at the first assault on Plevna, a loss which was equalled at the Borodino. To go still futher back, we pass through weapons of gradually decreasing power, the flint-lock, match-lock and wheel-lock, till we come to the bow and arrow. It would be easy with proper data to calculate the difference in power of the Martini rifle and the bow. The former could range at least 10 times as far, could be discharged probably 5 times as fast, and the soldier could carry 10 times as many cartridges as arrows. Assuming that the greater the potential destructive power of the weapons used, the greater the number of casualties, then if the Martini rifle produced 30 per cent. at Plevna, and the French rifle never more than 10 per cent. at Vionville, the deduction is plain that the losses due to arrows in the 14th and 15th centuries must have been negligible. Which is absurd. The records of Crecy, Poictiers, and Flodden, demonstrate this. It is not the weapons but the men who use them, not what men fight with, but what they fight for, that always has, and always will influence the number of casualties they will suffer. No doubt the possession of a superior weapon with the power to use it, will always enable the less callous civilized man to annihilate the more callous but less well armed savage, simply because the latter is annihilated before the breaking strain of the former is reached, but no mechanical superiority of armament will enable the civilized soldier to defeat the ill armed savage, if the former is unable to turn that mechanical superiority to its proper use and in a sufficiently short time. Hicks Pasha's army was undoubtedly better armed than its destroyers, and probably inflicted on them, up to the moment of defeat, a greater loss than it itself suffered, but because it was unable to punish its enemy up to the breaking strain of the latter, an excessively high one, before the latter was able to annihilate the mechanical superiority of armament by coming to close quarters, it perished; its own breaking strain being a low one, and comparatively easily reached. Its losses were in fact till the moment of defeat in proportion to its breaking strain and comparatively low, and after defeat in proportion to the cruelty and powers of pursuit of its victors, and therefore unlimited. What guides then do these principles afford us by which we

may estimate the losses we may expect to have to deal with in future wars? In these, speaking of wars between civilized nations, we may eliminate any inequality arising from different armaments, as as far as can be seen it is unlikely that one side will in artillery or musketry have any marked preponderance of mechanical efficiency over the other. The men too, will not in physical courage vary much. Some races may be better in attack, others in defense, some may be more dashing, others more dogged, but the average civilized man, be he Celt, Saxon, or Teuton, looks with comparatively the same distaste, whatever his nationality, on the sudden death, or the lingering torture of a gunshot wound. The chief deciding factor will then be the object fought for, or rather the effect of defeat or victory in the subsequent life of the individual or nation.

War to the civilized man is a thing abhorrent. A venture to be faced only in the direst necessity, a venture therefore that if faced had better be faced, once for all. *Vae Victis!* will be more than ever the cry of the victor. If he can, he will leave the vanquished no chance of re-opening the debate; for at least so long as he can foresee the chances of history. For instance the next Franco-German war will, it may be safely predicted, be the last Franco-German war, or at least the victor will do his best to insure its being so. The vanquished will then know beforehand that he fights for his last chance and will fight correspondingly hard. On this count, his own losses as well as those of the victor will tend to be high. In short, men will not fight if they can help it, and if they have to fight they will fight for all they are worth. On the other hand, there is not the slightest doubt that, to return to my previous metaphor, the value of pain is appreciated as compared with that of profit of any kind. If not individual men, at least nations are far less willing to face the horrors of a long struggle, than they were a hundred years ago. The dislocation of trade, the inevitable wide-spread suffering entailed even by a successful war, appeal very strongly to those so called humanitarian and rationalistic ideas which look on the material comfort of the individual in the present, as preferable to an increase in national prestige and prosperity, in the future, and it may be taken for granted, that the great mass of almost any nation, the poorer classes that is, care as a whole less for the government under which they live, than for the social system of which they form a part, and it must be remembered that while defeat a thousand years ago meant serfdom for the vanquished, and even in comparatively recent times the horrors of sack and pillage and of military occupation by a half disciplined soldiery, it now means an orderly occupation and a subsequent indemnity, the less the resistance. Much less would therefore the great bulk of the nation object to a defeat which destroyed an unpopular form of government, and gave room for an improved social system. Suppose for instance a defeat that destroyed a crushing autonomy and left room for a popular democracy. These conflicting factors may be expected to influence the casualties of future wars in the following manner:—

In the opening battles while there is still hope of victory the individual soldier will fight hard, and casualties be *pro tanto* high, but once the tide of victory has set definitely in one direction or the other, the voices of those who care more for material comfort than for glory, or who hope for favorable social or political changes from defeat, will make themselves heard, and the total casualties of the war be thereby decreased. For instance, take a Franco-German war, where the French were victorious in the opening battles: it can be understood that though the minor German states might be willing to suffer great losses in a victorious cause, they might on the other hand be somewhat quick, should things go wrong, to see the advantages of a surrender which should substitute for the present concentration of power in a single state, a confederacy of all the states on equal terms and with increased local liberty, and might therefore be the more ready to agree to give in before their energies were crushed by a prolonged unsuccessful resistance. They would therefore fight desperately till defeat seemed, if not inevitable, at least a fair probability, and their losses, and consequently those also of their enemies in the opening battles, would be high, but the collapse of the war would be sudden, and the total casualties and those of the later actions low. Tactical considerations however, also come in. In isolated battles the great influence that increased range will have on *tactics* is undoubted. Generals will, before the troops have become seriously engaged, be more easily able to see if their plans are hopeless or not. They will be therefore more easily able to extricate themselves from a hopeless attack, or retire from an outflanked position before heavy losses have been inflicted. At long ranges the effect of even improved weapons must be largely moral. The power of human vision has not for military purposes been increased even by optical aids, since the Crimea, and though artillery may be able to drop shells at a range of 2 miles and infantry to shower bullets at over a mile within fair proximity to their opponents, it is open to doubt whether armies will do each other much damage at those distances. Firing at an inoffensive target and firing at an enemy able to reply with equal vigor, are two very different conditions, and I think practical soldiers will agree that under the latter condition the careful aiming and the careful observation of the results of fire, so efficacious and so comparatively easy under the former condition, will frequently be conspicuous by their absence. There will thus tend to be a certain amount of comparatively harmless fencing before either commander commits himself definitely to a pitched battle. Once the battle has closed, as in previous days, perhaps even more than in previous days, the conduct of affairs will pass gradually out of the hands of the Commander-in-chief to successively lower grades, till at the supreme moment it will rest in the hands of the company or section commanders or even of the individual soldier himself. Battles will then be either reconnaissances in force where, owing to the long range at which it seems probable fire will be opened, losses will be comparatively small, or pitched battles,

where, after the first opening phases, they will depend on the individual "grit" of the opposing rank and file, and as such will be regulated by the considerations stated in the earlier part of this paper. Applying again these considerations, we may expect that in any future war between two civilized nations we shall have a certain amount of preliminary strategic fencing, then one or more severe pitched battles, followed by, if not a sudden collapse, at least by a resistance much less stubborn than would have been the case a hundred years ago, and gradually dying out from inanition. There is another factor which very considerably affects casualties in war, that is experience, what Prince Kraft I think calls "The habit of war, the being *aguerri*." He says (I quote from Colonel Walford's translation of the "Letters on Infantry," p. 6) "I am in a position to prove the same fact with reference to every body of troops, namely, that they suffered colossal losses in the first encounter with the enemy and later on obtained equally important results with smaller proportional losses." On page 7 he gives a striking instance of the working of this rule. This will of course always affect the losses of the later actions of any war, and to a corresponding extent concentrate the bulk of casualties into the opening battles. The point of interest to us therefore, lies in the pitched battles of the earlier period. In the earlier stages of these battles, the strain in the individual fighting man will be largely moral. Shells will burst and bullets fall close to him, an occasional lucky hit may even play considerable havoc among his comrades, but on the whole it may be anticipated that in the earlier phases more bullets will find their billets on mother earth than in human bodies. To the average man, however, the first and most obvious deduction from a "miss" is that the next shot may be a "hit." He is physically none the worse for seeing his comrade blown to bits, much less for seeing the long range fire of an opposing regiment knocking up a cloud of dust a hundred yards to his flank, but a continued experience of the latter, varied by an occasional repetition of the former, will not tend to leave his nerves in that condition of absolute equanimity necessary for careful aiming at a range beyond his normal vision, at an enemy whose position is to him a matter of faith more than sight. In the future this moral strain will have to be endured, apart from any preliminary waiting, for the length of time it takes him to cover say a mile and a half with frequent halts, and at every step it will increase in severity. Will the modern short service conscript be able under this prolonged ordeal to preserve the mechanical accuracy so essential to the proper use of his complicated weapon, sufficiently, to do any great material damage to his enemy, and will his enemy be able to do much harm to him? Is there not at least ground for supposing that the prolonged moral strain he will have to endure will so unhinge him that either he will dread to approach close to that apparently unshaken defense, or will shrink from that apparently unwavering attack before either he has done the enemy, or the enemy has done him much harm? A hundred years ago the pri-

vate soldier was as often, as not, a hardened ruffian, a man of great animal courage trained to a severe discipline, accustomed even in peace to witness or even suffer what the modern soldier would look on as unearthly torture. He marched into action with bands playing and colors flying; closely locked up to his flank man, till he came to a range we would now consider as absurd. An occasional round shot passed through the ranks, he could see it and the gun that fired it; there was nothing of the "unseen" about it that there is in long range artillery fire. A few crashing volleys and a charge, and the fight was done for the time; he was hit or escaped, in any way his enemy was a living tangible entity in sight, almost in touch of him. He had no time to think till the affair was over one way or another. The carnage was no doubt awful, the records of the Peninsular are clear enough on that point at least, but it was immediate. The strain was short and sharp. Now it is long drawn out. Is the modern soldier capable of standing that long drawn strain so well as to retain the efficient use of his weapon throughout? Will he not waste his fire at impossible ranges and do little harm to his enemy, at the same time that his enemy does but little harm to him, and will either have the courage to struggle on against imminent risk of death for 2000 yards till he comes to close quarters where the struggle will be man to man? The records of recent wars hardly lead us to think so. The men who in the last Chilian war were under magazine rifle fire said that they would sooner be shot at once than go through it again; and yet the South American races, as witness their naval actions, are no mean fighting men, and have had plenty of opportunities of knowing what being shot at means. Will the average conscript after 3 years' training like it any better when it is his first experience of the sensation? I should feel inclined to doubt it. On the whole, therefore, taking into consideration the moral and physical nature and breeding of the average civilized man, the moral strain that long range fire will impose on him and the excessively complicated nature of the weapon put into his hands, I feel strongly inclined to doubt if he will ever himself endure or impose on his enemy physical and material losses in any way comparable to those of earlier wars. The breaking strain of armies composed of such men will be attained mostly by moral suffering, and there will therefore be much less endurance left by which they may bear actual physical loss. I am thinking, it must be premised, of continental armies where every man not physically incapable of fighting has to fight irrespective of his moral nature. I can conceive a quite different state of things in an army composed of voluntary soldiers. They at least may be supposed to have some predilection for their trade and may therefore be able to face the early stages of long range fire, realizing that it is just as bad for their enemy as it is for them, and that to a very considerable extent the less the fear the less the danger, and that safety lies more surely in getting close enough to the enemy to silence him, than in trying to dodge his bullets at a distance. To recapitulate then, I hold that the losses of

wars as a whole, will tend to be less than in the past, far less when we consider that in the last century the losses due to disease were greater than those due to battle, and that the former are gradually getting more under control. In the Franco-German War, in the German army, for the first time in history, the losses by battle were more than those by disease. But the total losses by battle will also be less, wars being shorter and there being as a rule more inducement for the vanquished to give in at an early date. Exceptions will occur where some special cause for national animosity exists. Again the losses will be concentrated in a few pitched battles which will decide the war and turn the tide of victory in one direction or the other. In these battles owing to the fearful moral strain to which the troops will be subjected they will not be able to face so great a numerical loss as they were able to face in days when the moral strain was less. And in the future as in the past, it will be not the weapons but the men who handle them, not what men fight with, but what they fight for, that will decide in the first place the losses they will be prepared to suffer and, as a corollary, the losses they will be able to inflict on their enemy.

Let us now consider the distribution of casualties in point of space. Obviously in the case of all ballistic weapons, there is an outside limit beyond which losses cannot occur, a limit decided by the extreme range of the weapons in use. From that limit up to the enemy's position, the dead and wounded will be scattered more or less irregularly. Where must we expect to meet with the greatest bulk of wounded? This is the question that to the ambulance administration is the most important of all. Now I think it may be held as certain that as a rule the chances of a man hitting with any certainty his enemy depend at any range on the certainty of his aim at that range. Unaimed fire may make lucky hits, but on the whole it is more likely to frighten than hurt. And in the case of one using a long range rifle, it is, I think, at least a fair deduction that, under the moral strain imposed by service conditions, the chances of hitting beyond a range where the trajectory is practically flat, become smaller as the range increases. At that range or inside that range he has only to cover his enemy to have a fair chance of hitting him. Above that range the question of careful sighting comes in, and the difficulty of making accurate shooting at such ranges is well known to all sportsmen. The practical result of this is seen in the fact that systems of attack aim at getting as many men as possible, and as quickly as possible, to a position so close to the enemy as to be able from there to bring on him a steady effective fire. The longer the attacking force takes to cross the zone of "chance" hits, as I may call them, the zone corresponding to high trajectories, the greater the probability of men being wounded, on the simple principle that the longer you are out in the rain the wetter you get. Once in that position, the object apparently, is to deprive the enemy of the power of even holding his gun straight, by pouring on him a severe and effective fire. I speak under correction,

and may be mistaken, but it seems to me that Prince Kraft's account of the distribution of casualties at the attack on St. Privât gives one a fairly good idea of what we may always expect in a frontal attack. He says (pp. 132 and 133 of Colonel Walford's translation of the "Letters on Infantry") "I, on the morning after the battle which continued after nightfall, found numbers of our dead and wounded lying over the whole field from St. Marie in the direction of St Privât. These signs of the murderous struggle increased until at a range of from 500 to 600 paces; they lay in whole ranks in a half arch round St. Privât." It must be remembered that in this attack the Germans were caught in *flagrante delicto* in close order by the French, while well within Chassepôt range and had to advance, which they did by rushes and almost instinctively, till they got within effective needle-gun range before replying. Such a mistake is not likely to be repeated, because such inequality in rifles is not likely to again occur: and yet though the Germans were exposed in close order to long range fire, they lost less at those ranges than they did at 500 to 600 yards. Inside this range the casualties were again less. To resume the quotation: "Some of our comrades of the infantry judged from this fact that the French rifles shot high, and that they had fired over our soldiers when they got near. But this was not the real reason. Our infantry had suffered the heaviest loss in that line in which they had remained longest answering the enemy's fire, and had for their last rush up to the walls chosen the very moment when the fire of the defenders was altogether almost silenced." I make no apology for quoting this passage at length, for I think it holds the key of the problem. I therefore conclude that losses from infantry fire will be first felt at the extreme range of the enemy's rifle or otherwise at the extreme range at which the attack becomes visible. From that point up to a range depending on the flatness of the trajectory of the bullet, losses will depend on the time spent in covering the ground. Once a range is reached at which hitting depends no longer on sighting, but simply on holding the rifle straight, the attack must halt till it has knocked even the capacity for that simple operation out of its enemy, and it will be at that range where it has to halt for this purpose, that its main losses will occur. After that there will be one or more rushes up to the defender's position, but these will be impracticable as long as the defender has sufficient presence of mind to cover his enemy with his rifle. The near advance will therefore not occur till the enemy is so demoralized as to be practically harmless. The use of smokeless powder will make this more than ever necessary. With the heavy smoke of black powder, the attacker might rush boldly in unseen, now he can no longer do so. I have here spoken merely of infantry fire. As regards artillery the question is more open. I believe however, speaking still under correction, that as far as infantry attack is concerned, it is not expected that this shall be developed till the defender's artillery is to a considerable extent crushed. This will have to be the preliminary stage of the attack: the artillery duel. Dur-

ing the progress of this attacking infantry will, I understand, be kept as much under cover as possible, and the losses will be confined to the attacking artillery and the covering infantry. The whole subject of the effective power of artillery seems, however, awaiting decision. I would incline then to the conclusion that the distribution of casualties (speaking of a formal frontal attack) will be as follows. A number of casualties due to artillery fire during the artillery duel in the position occupied by the artillery at that time: a smaller number in its covering infantry, and any bodies of infantry that may happen to be in the line of fire and act as stopbutts for shots going over. A number of scattered casualties due to infantry fire beginning at the extreme range of the enemy's rifle, and increasing at first gradually, and later more rapidly, till the position of the decisive infantry fire fight is reached. Between that and the enemy's position, again comparatively few. The practical point of this is that ambulance arrangements for relief of wounded should be mainly directed on two points: (1) on the position occupied by the artillery during the artillery duel and, (2) on the position occupied by the infantry during the decisive infantry fire fight. The removal of the wounded from the former position can be carried on largely during the action and at least as soon as the cessation of the artillery duel; that of the wounded in the latter position must I think for many considerations on which I have not space to touch here, be deferred till the close of the action.

The last point in the subject under consideration is the distribution of casualties in point of time. I think that from the nature of things, casualties must in future be spread out over a longer space of time than before. In earlier wars casualties occurred with an appalling suddenness. Let me quote a few instances. I take my figures from a prize essay written by Captain Maude, R. E., published in Volume XVII of this journal. I quote his actual words: "Scharnhorst writing before Jena, quotes instances in his own experience in which a steady volley delivered at 80 or 100 paces dropped over 60 per cent. of the enemy in their own tracks. Similar instances are to be found in our own Indian and Peninsular records." Also I may interpolate, in Wolfe's victory on the heights of Abraham. "At Waterloo the French Imperial Guard, on the quality of which it is unnecessary to dilate, was shattered by a few volleys in flank from the 52d. In the American war the Confederates at Fredericksburg reserved their fire till the attacking force, Meagher's First Brigade, was within 120 paces, and then in a few rounds drove them back with a loss of 963 out of 1200 men." Here we have a few instances (which I fancy might be multiplied considerably) of the awful carnage of battles in the past, concentrated into a few moments of time. And the reason of this concentration is evident. The soldier had a weapon that could only carry a short distance and could only be reloaded slowly, therefore he retained his fire till he was certain of its being effective. Is this likely to be the case in future, or is it not appar-

ently rather the tendency to open fire at long ranges, and thus deter the enemy from approaching to the closer ranges where their fire would be more deadly? Tacticians only can decide: but there are some instructive remarks in Hubert's "Defense of Plevna" referring to the good effect, moral entirely apparently, of long range fire which seems to point in this direction. The point of interest for the ambulance surgeon is that the greater the period or time over which casualties are distributed, the easier will be his task, not perhaps of removal, but certainly of affording relief to the wounded.

On the whole subject I would offer the following conclusions:—

(1) Casualties as a whole will in the future be less than in the past, chiefly because men are more susceptible to suffering than their forefathers, and because the intense and prolonged moral strain to which troops will be subject will leave them less power of endurance to sustain actual numerical loss, and at the same time less power to properly utilize their highly complicated weapons and thus inflict loss on their enemy.

(2) They will be more widely scattered in point of space, owing to the increased range of modern weapons, and the consequently greater depth of fire-swept ground the attacking force will have to cover.

(3) They will for the same reason be more widely spread in point of time.

And that, therefore, on the whole the problem before the Army Medical Department which is how to relieve as rapidly as possible all the sufferers from gunshot wounds, will not be so difficult in the future as it has been in the past.

In so far as I have had to touch on tactical matters, I have spoken of course under correction, and only ventured to do so as an amateur who has read a considerable amount of military history, a few of the standard books on tactics, and has witnessed a very considerable number of practical demonstrations on the subject in the shape of field-firings, manœuvres, and practice camps. Wherever my statements or conclusions are obviously erroneous, it would give me the greatest satisfaction if other contributors to the Journal would point them out to me publicly or privately.

Military Notes.

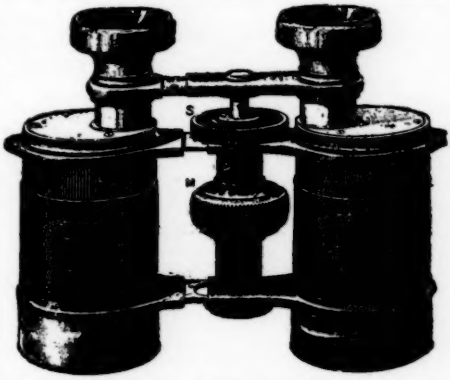
THE RANGE-FINDING FIELD GLASS.

Translated by CAPTAIN JAMES FORNANCE, 13th U. S. Infantry.

OF late years manufacturers of field glasses have had a number of very interesting improvements in view. Formerly field glasses were all constructed in the same style, differing only in their dimensions and power, they were none too powerful, the necessity of having the instruments portable required that they should not be unnecessarily increased in size.

A first improvement of great importance has been the combination of some new optical principles which give, with a great reduction in size, a glass having a very strong magnifying power.

But to be able to examine in detail objects situated at a distance is not all that is to be desired, it is also particularly important to know the distance from the observer to this object.



The question arises, how can such measurements be possible without complicated instruments, and without necessary calculations?

Notwithstanding the very great difficulty, this problem has just been solved in a most desirable manner by M. Clermont-Huet, manufacturer of optical instruments and furnisher to the Minister of War. The field glass called the "stadia-telemeter," which this skillful manufacturer has just introduced, combines among other advantages, that very important one of having a very simple arrangement by means of which the exact measure of observed distances may be obtained at once by one simple direct observation.

Its size is about that of an opera glass, it has very great clearness, a field of vision of six degrees, and a magnifying power of eight diameters.

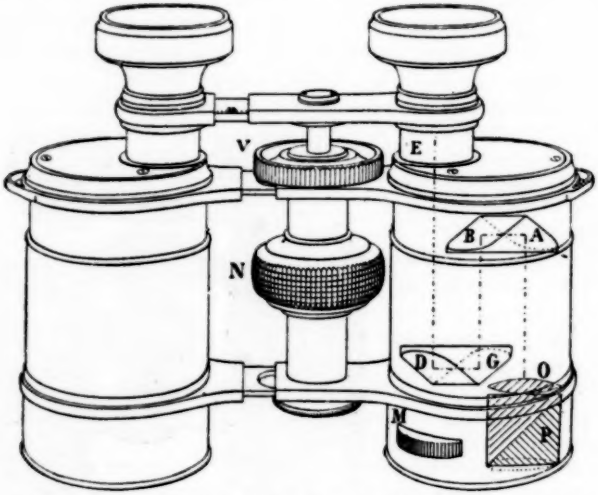
Notwithstanding its considerable optical power, it is not a large instrument; fully open it measures only ten centimetres. Such an arrangement is of great advantage in the field, especially for mounted observations, which as we all know are very difficult with the present model of field glass, with the long focal distance, in which the images

are more or less unstable in consequence of the unavoidable movements of the observer.

The contrivance which allows such a great reduction in the size of the instrument is both ingenious and simple.

The tube is not sufficiently long to show the images of the objects in front of the objective at proper ocular distances; in order to correct this M. Clermont-Huet has contrived by means of a combination of four reflecting prisms to cause the rays of light to diverge; thus a ray entering through the object glass O, takes the three fold course from O to A, from B to G, and from D to E, the full extent of the frame of the glass before having reached the eyeglass E.

This arrangement of the lenses and prisms which permits such great reduction in the size of the field glass is found to cause a decentralizing



of the objectives, the result of which is, while forcing the light rays to deviate from the optical axis, to cause a stereoscopic effect upon all the objects that are seen, with a greater relief than is obtained either with an ordinary field glass or with the naked eye.

The principle by which distances may be measured is also determined by an extremely pretty solution of the existing difficulty.

A double refracting movable prism P is so arranged as to produce two vertical images of the object; this constitutes the range finding apparatus.

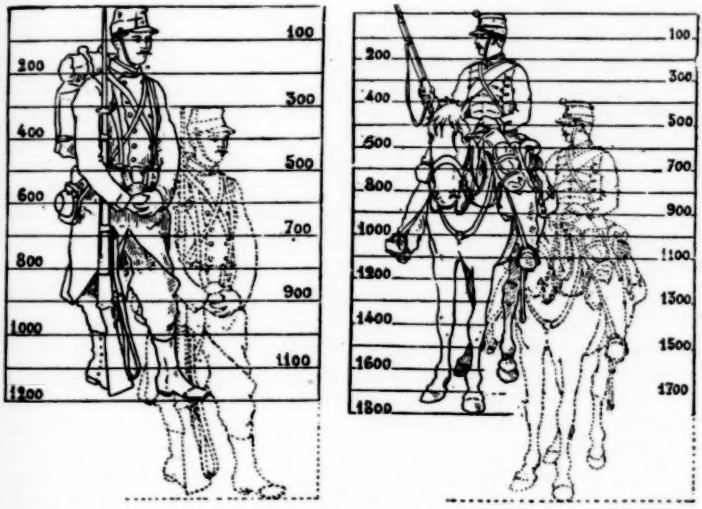
The field glass can be used at will either as an ordinary field glass or as a range finder; for the latter purpose all that is necessary is to bring the prism P in front of the object glass O, by means of the wheel M. This prism which is made of rock crystal intercepts only one one-hundredth of the intensity of the light, practically an inappreciable quantity.

The distance sought by means of this principle is attained by the separation of the two images. The method of proceeding is as follows:

The double prism having been brought in front of the object glass, if we look through the field glass we will see on one side a single image and on the other two images partly covering each other.

Now if the eye on the opposite side from the prism be closed, and we carefully observe the exact distance between the two images seen at the same time with the open eye, we have everything that is necessary to obtain the distance sought, by comparing this distance of separation of the images with that indicated on the engraved figures attached to the outside frame of the field glass. (See Fig. 1.)

In practice, for the purpose of simplification, only two range-finding bases have been taken, an infantryman and a cavalryman, each in cam-



paign uniform, the average heights of which are respectively 1 m.65 and 2 m.50.

But it is evident that any object of which the mean average height is known may be taken as the base, such as a window, tree, etc. In this case in order to be able to make use of the graduations on the instrument, it would be advisable to make some preliminary experiments to determine the sections corresponding to the different objects chosen.

This instrument has still another useful quality due to the variable distance between the barrels, which permits bringing each eyepiece directly in front of the observer's eye, who by this means is enabled to take advantage of all the light that the instrument is susceptible.—*La Revue Technique.*

THE DRINKING OF WATER.

Although water is not a food in the sense of directly contributing to the production of force or heat, it is yet a food in the sense that, without its presence in the body, all vital action must come to a standstill, as no change is possible in its absence. Our tissues contain an indispensable proportion of water; we are constantly losing large quantities by breathing, by perspiration and the various excretions, and, as just hinted, its presence is required for the occurrence of those various chemical changes by which we live and move and have our being. This being so, its value as an article of food may be taken as granted, and we may consider more particularly its action and uses when taken not as a food, but as a means to preserve health or to ward off or remove disease.

The effects produced by the drinking of water vary with the manner in which it is drunk. If, for instance, a pint of cold water be swallowed as a large draught, or if it be taken in two portions with a short interval between, certain definite effects follow—effects which differ from those which would have resulted from the same quantity taken by sipping.

Sipping is a powerful stimulant to the circulation—a thing which ordinary drinking is not. During the act of sipping the action of the nerve which slows the beats of the heart is abolished, and as a consequence that organ contracts much more rapidly, the pulse beats more quickly and the circulation in various parts of the body is increased. In addition to this, we also find that the pressure under which the bile is secreted is raised by the sipping of fluids—a fact the importance of which we shall notice directly.

Many individuals may have been at times unpleasantly conscious of the fact that a glass of wine or beer sipped gets into the head much quicker than if drunk at a draught. They will now be in a position to understand why this is so; the explanation being that the temporary paralysis of the inhibitory nerve of the heart, and the increased stimulation of the circulation, favor the rapid absorption of the alcohol and the production of its consequent effects. The same thing occurs if the fluid be sucked through a straw, the effects of sipping and sucking being identical.

Swallowing in the usual way has not the stimulant effects of sipping, but it has one or two special effects not produced by sipping, the use of which we shall mention a little later.

The effects of drinking cold water are these: If, say, a pint of cold water is swallowed straightaway, the temperature of the body is slightly lowered—about one degree Fahrenheit—the pulse rate is somewhat decreased (not greatly increased, as by sipping), and the respirations are slightly accelerated. The blood vessels in the lining membrane of the stomach are at first contracted; they very soon, however, rapidly dilate, the blood flow in them is increased, and the secretion of gastric juice is stimulated.

There are, on the other hand, many persons who find that these

effects are brought about better if they take warm water instead of cold, although at first sight it may appear somewhat strange that like effects are produced by both hot and cold water. The explanation is simple. The warm water acts exactly as does the cold, only without the previous contraction—its action being to at once dilate the vessels after its reception by the stomach. The practice of drinking at meals large quantities of liquid is bad; but small quantities may be taken without harm, although undoubtedly it is wiser to drink either before or after the meal, if we cannot limit our consumption of fluids to a distinctly small amount. Whenever a meal is particularly rich in fatty material, it is a good plan to drink some time after the meal as in this way the digestion of fat in the intestines is aided.

That water possesses a purgative action is a thing well known to many people. This particular effect is due to its power of stimulating the secretion of bile and also of increasing the peristaltic action of the intestines; bile being a natural purgative and increased peristalsis being the enemy of constipation and sluggish bowel action. If plain water be taken, its purgative effects are best produced by its being cold; if natural mineral waters are taken, they should be mixed with a small quantity of hot water so as to be at about the same temperature as the stomach. Warm water is more readily absorbed than cold, and moderate quantities than large ones, absorption being retarded if large quantities of either warm or cold water are taken at once. The best time to obtain the purgative effects of water is on rising in the morning. A glass of cold water taken on rising is often quite sufficient to procure an easy movement of the bowels, and this result will be the more certain if the water be sipped while dressing. This sipping operation should not, however, be hurried, but should be gone through slowly and at short intervals.

Free drinking of water produces effects upon the kidneys and tissues of the body generally no less important than those we have been considering. There is every reason to believe, from observations, the nature of which it is unnecessary for me to state, that the increased excretion of urine which follows the drinking of plenty of water not only clears the body of many poisonous and effete substances, but is itself an index of changes within the body which have for their end the enhanced health and comfort of the individual.

Much harmful material which has often to answer for malaise, want of energy, and various aches and pains, is undoubtedly washed out of the tissues and excreted by the kidneys as the result of free water drinking. This alone is decidedly beneficial, but, in addition, the drinking of much water causes the tissues to be changed, with the result that vitality is increased and strength augmented. So great in this direction are the effects of cold water, that persons leading sedentary lives may often obtain, by drinking plenty of water, much of the feeling of health and exhilaration which results from taking exercise—a fact not difficult

of belief when we remember that a glass of cold water, slowly sipped, will produce greater acceleration of the pulse for a time than will a glass of wine or spirits taken at a draught. In this connection, too, it may not be out of place to mention the fact that sipping cold water will often allay the craving for alcohol in those who have been in the habit of taking too much of it, and who may be endeavoring to reform, the effect being probably due to the stimulant action of the sipping.—A PHYSICIAN. —*Scientific American.*

THE STERILIZING OF WATER.

Schumburg (*Deutsch Med. Woch.*, No. 10, 1897) describes a new method of sterilizing water by the use of bromine, one grain being sufficient to destroy all the bacteria in one quart of water, the bromine afterward being neutralized by ammonia, so that a clear and tasteless water is obtained. For this purpose a twenty per cent. solution of bromobromiodide (bromiodide, one part; bromine one part; water, five parts) is used. Thirty minims of this solution are sufficient to sterilize in five minutes one quart of river water. If the water is very hard or very foul, the lime salts and the ammonia contained in it neutralize a part of the bromine, and in such cases it is necessary to add the bromine solution until a faint yellow color is obtained and persists for at least half a minute. An equal quantity of a nine per cent. solution of ammonia suffices to neutralize the free bromine. It is desirable that these amounts should exactly correspond, although a faint taste either of bromine or of ammonia is not objectionable. When the bromine is exactly neutralized, the water is clear and can scarcely be distinguished from the original water, while the amount of bromine salt which it contains is so small that it has no effect upon the system. This method bids likely to be of especial use in times of epidemic, in war, etc.

COLORS IDLY SPREAD.

A strong pronouncement by the Commander-in-chief as to the impossibility of carrying colors into action has during the past week brought the subject of these emblems into considerable prominence. It is not easy to invest a discussion of this sort with any particular novelty, but it may be convenient to group under two heads—sentiment and utility—the main arguments of those who accept without demur the official decision that colors are never again to be carried on the battle-field. To take the plea of sentiment first, it is a mere truism to say that the history of colors is the history of the British army. No words can fitly express the peculiar significance of such a chronicle, written as it is in letters of blood. Viewed from almost any standpoint, the colors of a regiment, whether themselves the actual relics of many a strenuous battle or the successors of others laid to honorable rest in some great cathedral or the church of a country town, must necessarily be surrounded with associations, the splendor of which is mingled with strange pathos and solemnity. Custom, moreover, has done much to surround the colors with

peculiar sanctity. The habitual military salute, the doffed hat when in mufti, the largesse to the drum-major of the old days when the newly-joined sub. carried a color for the first time on parade, have all combined to maintain the goodly belief that the colors are to the regiment something in the nature of an African fetish. Apart from this there has always been associated with the colors a glorious notion, sometimes gloriously put into practice, that when the tide of battle is flowing strongly in the wrong direction, they shall form a rallying point round which the British officer and his men can gather in the proud consciousness that in such a neighborhood death cannot but be honorable. Traditions and associations of this sort are simply beyond the reach of argument. To attempt to analyze them would be as futile as it would be to characterize the precise motives that lead a man to win the Victoria Cross, to conduct a forlorn hope, or to do a variety of things which very possibly in his sober senses he would never dream of doing.

For many generations regimental colors have been to the British army what no other institution could have been, and it is undeniable that if they are never again to be taken into action a certain amount of the sentiment hitherto attached to them must inevitably disappear. Yet sadly, bitterly, as one must regret the severance of such a tie between the personnel of a corps and its battle history, there is no room for serious argument against the now definite renunciation of the colors as a factor on the the battle-field. As Lord Wolseley says, to ask a man nowadays to carry a color into action is equivalent to asking him to get himself assassinated. Nor does the objection end here. If it did it would probably not carry all the weight it might, as there are hundreds of officers sufficiently imbued with the spirit of the past to willingly undertake such a deadly responsibility rather than see an old tradition sacrificed. But it is essential in modern war that neither individuals nor units shall be unduly conspicuous, since, however desirable it may be on occasion to draw a hostile fire, it commonly happens that it is extremely inconvenient to give a determined enemy any sort of distinctive mark on which to direct the deadly fire of modern weapons. Not only that, but colors must be carried by officers so long as there are officers to carry them, and officers to-day are not such a superfluity that to enter upon a warm engagement with two short is either convenient or desirable. Fire discipline requires the keenest possible attention on the part of everyone holding a commission, and war wastage will probably make the supply of officers one of the most serious problems of the next great campaign. Half measures, such as carrying the bare poles into action, would with English troops assuredly prove ineffectual. Let us, then, be content to face the situation as it lies, and to regard the colors in action as one of the glorious relics of a splendid past which unfortunately the exigencies of modern war will not permit us to retain. Not a few other traditions, naval as well as military, have had to "go by the board" owing to modern requirements. In the matter of regimental colors the change has

been long impending, and comes as no sort of painful surprise. So far as the army is concerned the clear recognition of the inevitable will, perhaps, even come as something of a relief after years of more or less uncertainty. In any case the fiat will be recognized as one that has been arrived at by competent authorities who have given the matter earnest consideration, and who certainly would not have sought to practically abolish a grand tradition unless absolutely compelled to do so by motives of humanity, prudence and military policy in general.—*Army and Navy Gazette.*

RANGE-FINDING IN THE ARMY.

A melancholy interest attaches to the annual report of the School of Range-Finding at Aldershot as it is signed by the Assistant-Instructor (Lieutenant J. St. C. Macmillan, R. A.), Lieut.-Colonel A. Whitehouse, R. A., the instructor, having died suddenly on December 31. The report is divided into three parts. The first is devoted to "Artillery—instruction, inspection, and experimental." During the year 1896 there were two courses for officers and three for non-commissioned officers of the Royal Artillery. Of thirty-four officers who joined the classes, thirty-two qualified, two having had to withdraw on account of illness. Of fifty-four non-commissioned officers who joined the school fifty-two qualified. The whole instruction of the year was carried out with the mekometer, which is now the service instrument. The course for officers, Royal Artillery, lasts fourteen days, and it is found that this time is "quite long enough to give a thorough knowledge of range-finding and sufficient practice in the mechanical part of it to qualify the officers to efficiently superintend the range-finding in their batteries without insisting on their being highly skilled as operators themselves." At the conclusion of each course there is a written examination on the theory and construction of the instruments. It is found that by this means a much better opinion can be formed as to individual knowledge, power of expression, and capability of imparting instruction to others; frequent opportunity is also taken advantage of during a course of making the candidates for certificates act as instructors with black-board and diagrams. Thus the capabilities of all are thoroughly tested. The arrangement applies to both officers and non-commissioned officers, and is found to work well, for there is everywhere, it is gratifying to learn, "a marked improvement in the ranging of artillery, which could not fail to produce its effect if we were to become engaged in any large military operations."

It is in the details of infantry instruction, no doubt, that there will be most interest taken. We learn from the report that there were five classes of instruction at the school for this arm in 1896, which were attended by thirty-eight officers and seventy-two non-commissioned officers. Of these, thirty-six officers and fifty-seven non-commissioned officers qualified. Each course is divided into two parts. The first fourteen days are devoted to lectures, drill, and work at stationary objects of increasing degrees of difficulty. At the end of this an intermediate ex-

amination is held, which, however, does not count towards certificate. The idea of this is to ascertain the individual progress made, and whether it is sufficient to justify beginning work at moving objects. The remainder of the course consists of work at moving objects, upon which great stress is laid for infantry, and further work at difficult stationary objects, work under cover, and on difficult ground. The examination at the end of each course is divided into three parts, viz.: Written examination; individual examination, at stationary objects, of each man, both as "reading man" and as "right-angle" man, the other number being one of the instructors; individual examination as "right-angle" man at a moving object. The above has been found to answer admirably, and to afford a thoroughly reliable test of individual merit and capability. During the year an inspection of the range-takers of each infantry brigade at Aldershot was made quarterly. The test at each inspection is the same, the object being to ascertain whether, in the case of school-trained men, they have kept up, or, in the case of battalion-instructed men, attained to, the standard of qualification, as far as the practical part of the work is concerned, that is expected at the close of a course, and below which a man cannot be regarded as a really reliable range taker. The results of these inspections show that there must be a steady drain on the numbers of school-trained men, and also that the amount of time they get to keep in practice after returning to their battalions is a very variable quantity. The last, however, was the first year of an entirely new system, viz., the keeping up of a definite regimental establishment of range takers. It has as yet hardly had time to show fruit.

The feature of the past year as regards infantry range-finding was the introduction of two most important changes. Officers and men have been sent to attend courses from battalions at out stations, whereas formerly they were only drawn from those at Aldershot; and in addition several officers on leave from abroad, four officers of Royal Marine Light Infantry, and one officer of the West India Regiment have been instructed. By this means a much larger number of battalions are now in possession of trained instructors, whilst battalions at Aldershot are not called upon, as formerly, to keep sending men through courses at the school when they were often already in possession of plenty of trained men. And again, the introduction into the Queen's regulations of section 7, paragraphs 282–283A, laying down a fixed regimental establishment of range-takers and instituting an annual inspection of these by general officers commanding, marks an entirely new departure. The report says with reference to these changes:

"The increased interest and keenness taken in the subject by those attending the classes is most noticeable, and the good that will accrue to range-finding in this branch of the service will be a great gain. Officers and non-commissioned officers alike now feel that on their return to their battalions they have a fresh interest in the training of others being put into

their hands, and that the results of their work will not be lost or pass unnoticed, but that it will be periodically tested in whatever district they may be. They have thus a direct incentive that never existed before to do well whilst at the school and to keep up their knowledge and practice after leaving it."

When it is fully realized what importance attaches to the obtaining of a correct range, now that our infantry soldier is in possession of a repeating rifle, officers of this arm will show a greater interest no doubt in a subject upon which so much depends on service. If men are to husband their fire, as they should be taught to do, there is no more effectual means of producing this desired end than for each battalion, nay each company, to have on its establishment a fair sprinkling of officers and non-commissioned officers who have undergone a course of practical training in range-finding. The staff of the Aldershot School have done their utmost to introduce an effective system, and they deserve to be supported. The school has labored under disadvantages on account of the changes which have taken place on its staff, but the report for 1896, all the more interesting details of which we have summarized, is evidence that we are progressing in the matter of range-finding as in other things.—*Army and Navy Gazette.*

ARTILLERY IN ACTION.

At the present time considerable divergence of opinion exists as to the best and safest method of bringing artillery into action. With us it is the rule to do so by means of the horses, and to unlimber in the position itself without any regard to cover or exposure to the fire of the enemy. Colonel A. E. Turner, C.B., Assistant-Adjutant-General, R.A., who recently published an interesting paper on the "German Method of Bringing Guns Into Action," observes that with the Germans, on the contrary, it is the custom, with certain permissible exceptions, to unlimber in rear of a fire position, and to run the guns up to it by hand. In the non-official portion of the *Militär-Wochenblatt* there recently appeared an article condemning the German system of "creeping" into position, as the writer sarcastically terms it. Among other objections it is urged that by seeking cover and running up the guns deliberately by hand the infantry, when exposed to the fire of the enemy's artillery, would be left in the lurch, shattered and rendered incapable, owing to their heavy losses, of taking advantage of the victory of the guns and of completing any success gained by the artillery. To quote the German writer, "what good will it be to us if, when our artillery has subdued that of the enemy, our infantry has already been so shattered by the fire of his guns that it is incapable of completing the victory?" This is a case, Colonel Turner holds, of putting the cart before the horse. One of the most generally known and fundamental principles of latter-day tactics is that the fire of the hostile artillery must be subdued before the infantry advances to

the attack, and that until it is subdued such attack is impossible. Colonel Turner quotes an extract from the letter of an eminent German artillerist, to whom he wrote for information on the subject, in support of his contention.

The letter runs as follows :—

"With regard to your other question with reference to the method of coming into action, our rule is that the guns are to be brought up to the firing position by means of the horses, only so far as the latter are under cover from the fire of the enemy, and that when that can no longer be the case, the guns are unlimbered and run up by hand by the detachments. This is invariably done when coming up into action against the enemy's artillery already in position. If the latter is not the case, it is permissible to bring the guns up into the firing position without previously unlimbering. This, however, must be regarded as an exception to the rule. When, however, the fire of the enemy's artillery is nearly subdued, and when, in consequence, ours is not exposed to any great loss; when, moreover, we advance to a second or subsequent position to support the decisive infantry attack, then we bring up the guns into the firing position by means of the teams. This also is done in case of a pursuit, when it is all important to gain time. All these cases must, however, be regarded as exceptions to the rule, which is that the horses are not to be exposed to the enemy's fire, and that the guns are to be unlimbered under cover and run up by hand by the gunners. The guns being unlimbered, the Nos. 1 run forward to the firing position and select the exact site for their respective guns, which are then run up by hand to them. With regard to what you say you heard took place at the Kaiser manœuvres this year, it was probably done in a case of pursuit, or in support of an infantry attack, in either of which cases the guns would have been brought up by the horses. In order, however, to fatigue the gunners as little as possible, the battery commanders are directed to reconnoitre the ground to their front most carefully, so that the batteries may advance under cover without unlimbering, as far as practicable, without being seen by the enemy; or, in other words, that the distance over which the guns are run up by hand may be reduced to the utmost possible extent. This, of course, calls for a most careful and searching reconnaissance on the part of the battery commanders. In order to avoid observation from the enemy as long as possible it is the custom in some artillery regiments to dismount the drivers, who lead the horses towards the firing positions as long as they can do so under cover; when this is no longer possible the guns are unlimbered and run up by the gunners."

Personally Colonel Turner tells us he has never seen any other method than this pursued by the German artillery. In conclusion, he quotes a few sentences from remarks of a German general, an eminent authority upon the lecture "Artillery from an Infantry Officer's Point of View," given by Captain Pilcher, Northumberland Fusiliers, at the Royal Artillery Institution, Woolwich, on March 12 last :—

"I have just stated that direct fire was the rule, but every care should be taken to avoid exposing the horses of a battery when coming into position and only the muzzles of the guns should show above the crest. Again, I have often seen seventy-six guns in position, without more than the muzzle of a single gun being exposed. Before 1806 some few German officers, more advanced in thought than the rest, advised making use of ground and cover, but the majority instigated by the same spirit with which some of the officers taking part in the discussion seemed to be imbued, answered, "What, shall the army of Frederick be made a school for cowardice! No never.' They refused to practice the use of the ground, and the result was Jena and Auerstadt. To say that to make use of ground in any way destroys 'der Geist der Waffe' (the spirit of the arm) is nonsense. I have already said that 'Wirkung geht vor Deckung' (effect must be considered before cover), but this is 1896, not 1870, and the effect of infantry fire must be multiplied by four or by six in comparison with what it was in 1870, and what is the good of artillery coming up close if by doing so the effect of its fire is not greater? The effect of artillery fire is equally great at 600 or 1200 yards, but if under infantry fire their losses at the former distance would be enormously greater; another point to consider is that if you come too close you cannot feed your guns, for your ammunition carriers will be all shot."

That great authority, General von Goeben, says, "artillery is a fine instrument, which must not be put into the first line except in most exceptional circumstances." There are two ways, Colonel Turner maintains, of teaching men. You can teach them to be 'dumm dreist' (bold through ignorance), to disregard cover and to believe that there is nothing to fear if they keep a bold heart. The other plan is to teach men what dangers there are and how to avoid them, just as a sailor or a steeplejack is taught to appreciate and how to avoid the risks of his trade. Men trained on the former principle find out on the first day of battle that their teachers have been in error and they lose all confidence in them. Such teaching may sound excellent in peace, but will not stand the strain of war. The second will stand any test. It is the inevitable result of a very long peace that theory should hold the field, because the practical is impossible except in actual warfare, when the all-important factor of human emotions is brought into play, and when misconceptions and errors of judgment soon become apparent, and lessons are speedily taught at the cost of blood. Colonel Turner's paper contains so much that is sound that it deserves to be read generally by all officers who take an intelligent interest in their profession. It has been printed by the Royal Artillery Institute, Woolwich.—*The Army and Navy Gazette.*

MODERN FORTRESSES.

"Modern Fortresses and Their Defense" is the title of a lecture delivered some time ago before the Military Society of Berlin by Captain Schroeter, of the German Engineers. A translation of it has been made

for the Royal Engineers' Institute, Chatham, by 2d Lieutenant J. Charteris, R. E. The last thirty years form a most important period in the development of fortification and of fortress warfare. Two influences, we are told, have been at work to give the matter significance: "First, as far as concerns the defense of countries, and thus to a certain extent with regard to strategy, the formation of alliances in Europe; and, secondly, with reference to the shape of the works and to the attack and defense of single fortresses, the unexpected progress in the matter of armament, and especially of artillery." It is an interesting study to trace military progress at all times, but the last thirty years have been fruitful in results. Captain Schroeter contented himself by reviewing the fortification question solely in relation to tactical considerations. His object, as he said, was not to adduce any new ideas of his own, but to give to those whose duty does not bring them in contact with the science of fortification a general view of the present situation and show how the development of fortification has been brought about by the changes effected in the tactics, etc., of an army in the field. It will be seen that his purpose is good, for it is surprising how groovy soldiers may become, and how little frequently cavalry and infantrymen will interest themselves in what they may call the "engineers' business." The development of artillery in the last decade has altered the whole circumstance of war. Some there are who object to permanent fortification altogether. But, as Captain Schroeter says, what response has there been to their condemnation of them in influential quarters? "No government, not even the most powerful, dare take the responsibility of doing away with them." The proposal to substitute a continuous line of defense works for the present girdle of forts has, as we know, met with no recognition. Brialmont was all in favor of the old form of fort—broad, deep, of high profile, and at correspondingly wide intervals. But the views of the majority of German engineers, we now learn, are in favor of small unimposing forts, answering more to the idea of intermediate works at small intervals. These intervals are prepared in time of peace for the artillery duel by means of concealed bomb-proof cover, roads of communication, and masks. Armor, it is proposed, should be used with the most important guns of the defense, *i.e.*, those whose duty would have the most unfavorable effect on the conduct of the defense, the forts which sweep the intervals and flank ditches. The lecturer's sympathies are with a suitably modified Brialmont armored fort. The subject of surrounding the centre of the fortress with intrenchments is too long to enter into fully. The reasons advanced in favor of this course are so cogent that in many new forts the construction of a supplementary ring of entrenchments round the centre has been regarded as essential. Brialmont considers that even a provisional fortress should be provided with an entrenchment of this nature. A simple polygonal form of entrenchment, which would stop a surprise attack in force, is generally considered sufficient.

It has lately been laid down as a principle by various authorities, including Brialmont and Wiebe, that every improvement in fire-arms, even the introduction of smokeless powder, has been to the advantage of the defense. The lecturer, touching upon the attack, says :—

"The attacking forces have first to get into a position to use their guns, and during this period act on the defensive, moving forward with many halts; the defenders, on the other hand, are already in the most favorable position. It must be admitted that these equalizing factors are of the utmost importance, and with skillful handling, combined with a certain amount of luck, are calculated to turn the balance to the side of the defense. The possibility of successful defense in old forts with unfortified intervals increases in newer forts with permanent intermediate works, and with armor amounts to a hopeful probability. The theory that the artillery duel will in future be of short duration seems quite erroneous; on the contrary, unless with conditions exceptionally favorable to one side or the other, it may well last till both sides have exhausted their resources without definite result. The silencing of the artillery of an old fort seals its fate. Even in what may be called 'modernized' forts, the high profile and large targets force one to the opinion that under modern artillery fire the older parts, at any rate, of the works would soon be in ruins, and the utilization of the new works be rendered most difficult."

History shows that after every advance in the material for attack, at first a resulting weakness in defense appears, but after the plans of fortresses and the methods of defense have been modified to suit the new conditions, difficulty is removed and the advantage in the end lies with the defense. Von Müller says that in cases where formerly fortresses left to themselves had to surrender, on account of exhaustion either of supply or strength, now there is no such necessity, as the attack, not being always possessed of unlimited resources, may reach a point of exhaustion where further advance is impossible.

"All fortification," says the German lecturer, "is of the nature of a compromise between the ideal and various limiting influences, the chief of which is the cost. The nearest approach to the recognized ideal is only to be obtained by a careful consideration of the various measures, and by precedence being given to those of most importance. The chief object of fortification is to place in position a strong armament, combined with those arrangements which insure the greatest effect for the artillery. To these arrangements belong the employment of quick-firing (*i. e.*, quick-loading guns) at least in the first artillery position, and preparations for the supply of ammunition and for observation. Secondly, measures have to be taken to preserve the guns in a serviceable state; this is chiefly a matter of cover. In addition, arrangements for infantry have to be considered. The chief task of the infantry is in the protection of the artillery and in the defense at close quarters. The more carefully the permanent works have been constructed the fewer in-

fantry are required, and the greater are the difficulties that confront the attack. The above measures refer to the actual fighting position. Finally, attention has to be given to those parts of the organization which will not necessarily take part in the action. Among other things the question of cover for that part of the garrison not actually engaged, of the internal arrangements, of the interior defenses, of other retrograde entrenchment cover for a retreat. Another important question, with regard to which the possible is far behind the ideal, is that of the strength and quality of the garrison. Here, however, another powerful factor, and one which it is impossible to estimate, comes in, viz., the personal influence of the commander and his officers. The war of the future will doubtless afford great examples of conduct of fortress warfare. It is to be hoped that men like Gneisenau and Todleben may be forthcoming, who can use all the material available to the best purpose, and also inspire the garrison with their own indomitable spirit, and with a confidence in the defensive power of the works which in itself affords a great claim for success. It is the business of those who design fortresses to see to it that the confidence is not misplaced."

The Royal Engineers' Institute is to be commended for issuing their professional papers. This is the fifth of a series and it cannot fail to serve a useful purpose if read by the officers of the army generally. To the officers of the Corps of Royal Engineers it must be profitable in every way to have their time employed in watching the progress of foreign armies and translating such papers and articles as may be of value.—*Army and Navy Gazette.*

LORD ROBERTS ON MUSKETRY EFFICIENCY.

At the distribution of prizes to the successful competitors at the Annual All-Ireland Rifle Meeting, at the Curragh Camp, on Saturday, Lord Roberts delivered a most important speech on the value of efficient musketry training. When he first entered the army, Lord Roberts said, with the exception of a few scattered skirmishers, opposing lines had to approach to within some 80 yards of each other before they could open fire with any chance of hitting one another. There was then much to be urged in support of the theory that marksmanship was but a small matter in comparison with drill. As frequently happened, however, in our conservative army, that theory long outlived the conditions which had given it birth, and as lately as 20 years ago there were many commanding officers who looked upon target practice as an unnecessary nuisance forced upon them by the authorities to the detriment of drill, and therefore of service efficiency. The experience gained in the wars of recent years showed so clearly the fallacy of this theory that the value of good shooting had been more frankly acknowledged by the British than perhaps by any other army. Notwithstanding this experience, the theory that musketry was in some way antagonistic to, or at any rate quite apart from, drill and efficiency survived until a very short time

ago. His own opinions on this most important question were embodied in the musketry regulations for native troops which were published when he was Commander-in-chief in India; and he could at all events claim for them that they had stood the test of time, for he found that in the latest edition his regulations were practically unaltered, and the excellent shooting of the majority of the native regiments, especially as regards section volleys at moving or disappearing targets, was probably well known to all soldiers who had recently served in India. The general principal he had always kept in view was, not only that drill and discipline could and should help musketry, but that musketry, when properly conducted, could and should help drill and discipline. He was now speaking of peace range-musketry and barrack-square drill; but he firmly believed that, under service conditions, while drill and discipline were essential to good shooting, the act of shooting itself might be so carried out as to sustain moral and discipline far beyond the stage at which they would otherwise tend to give way. In fact, and he spoke from what he had seen, not only ammunition but also discipline itself was apt to melt away very rapidly under the pernicious influence of unrestrained firing. Whereas, when backed by the continuous assertion of authority, as laid down in the regulations for collective fire, moral and steadiness would stand the severest strain, and—a very important point—there was infinitely less chance of the pouches being prematurely emptied. It was sometimes urged that on the field of battle, when the 700 or 600 yards range was reached, it would scarcely be possible to prevent men from firing individually and indiscriminately, and that it would therefore be better to train our soldiers to always fire individually. This view did not commend itself to him. Once launched to the attack men would, no doubt, get out of hand occasionally, but if they had been carefully trained, it should not be difficult to pull them together, and if that could be done sufficiently to enable them to fire even one volley, it would give them a new lease of courage and steadiness. He hoped they would understand that, while strongly advocating the necessity for paying attention to collective fire, he considered that perfect individual shooting was most important, for it was evident that, if a section was to fire good volleys, the units composing it must be good individual shots. As a matter of fact the successful individual marksman, combining as he did eye, nerve, patience, and judgment, was a person who commanded his highest admiration. All he wished to emphasize on that occasion was that, in his opinion, good, rapid volleys, under the control of a practised commander, constituted the very essence of military shooting, and that it was by meetings such as that that they looked to produce the fine individual shots who might some day be available either to command fire units themselves, or to place their hardly acquired skill unreservedly at the disposal of experienced section leaders. To illustrate the advantages of a happy combination of drill discipline and musketry, such as he thought necessary for the training of a soldier, he reminded them of

what happened a few weeks ago on the North-west Frontier of India. A treacherous attack was made by the tribesmen of the Tochi valley on one of our political officers and his escort, which consisted of 12 sabres, two guns, and 300 infantry. With the exception of six British officers, the troops were all natives belonging to the Punjab Frontier Force. Within the first few minutes of the attack three of these officers were killed, and the other three were so badly wounded that they were useless as leaders. The country was most difficult and all to the advantage of the enemy, who knew every inch of the ground, which was nothing but a mass of rocky ridges. But our brave native soldiers, under the guidance of their native officers, putting in practice what had been instilled into them by their training in time of peace, were able to retire in perfect order for three whole miles, taking up position after position, and keeping the enemy at bay by their volley firing, until they reached a place where they determined to make a stand until reinforcements could arrive. The reinforcements consisted of two companies of the 1st Sikhs, under the command of Lieutenant H. de Brett, R.A., who prudently brought with them spare ammunition for guns and rifles. So great was their eagerness to reach their hard pressed comrades, that they covered a distance of nine miles in an hour and a half, although each man carried a rifle and 70 rounds of ammunition. They, as soldiers, could appreciate what that meant, under a burning sun and over rough, stony ground. The discipline and musketry training must have been perfect which enabled men to accomplish such a feat as the retirement without hurry or confusion, and, while carefully husbanding their ammunition, to fire volleys with such good effect that considerable numbers of the enemy were reported to have been killed.—*United Service Gazette.*

DECKUNG.

A very important article has lately appeared in the *Militär-Wochenblatt* upon the question of utilizing the ground for cover—our contemporary calls it "deckung." The *Wochenblatt* is much afraid that, in training men to seek protection, they are trained to hide themselves, and that the military spirit of the offensive is apt to be destroyed. It is the right and duty of the officer, says our contemporary, to take account of losses, and to diminish them as much as possible, by utilizing the ground. But he must never be dominated by the fear of loss to the forgetting of the great fruits of success. The German military paper is so convinced of the danger that it says without hesitation that the training in the use of ground should be wholly eliminated from the education of the soldier, in so far as it relates to his personal security during the attack, or, as the regulations say, for the attenuation of the effect of the enemy's fire. Changes in armament have not changed human nature, and our contemporary is convinced that men will be only too willing to seek protection for themselves, without being specially trained in the art of finding it. It is for the leader to decide if the conformation of the ground is favorable and admits hope of success, but, when the order to advance has been

given, the man has no right to think of whether he shall go forward or not, or whether he shall find protection or not; above all things he must go forward. Nevertheless the *Wochenblatt* does not oppose the spirit of the German regulations, and would not habituate troops to despise the protective value of the ground they pass over, but it must be taught to them not as individuals, but as troops in the field, always under the order of their officers as to whether they shall seek its protection or not. "Let us expel from our ranks," says our contemporary, "this cult of protection and fear of loss; they can only have destructive influence upon the boldness of the troops and the spirit of the offensive in them." —*Army and Navy Gazette.*

CORDITE AND THE LEE-ENFIELD RIFLE.

Great is the truth, and it will prevail, but it often takes an unconscionably long time about it. Although the new magazine rifle and its ammunition have been in the hands of our troops for a considerable period, the comparative value of the two remains still a matter of criticism, although it must be admitted that recent experiences have been favorable. The Bisley meeting just concluded should at any rate silence critics as to the accuracy of the weapon, as not only were the winning scores in all competitions enormously higher than in previous years, but, using the service weapon and ammunition, Captain Dutton Hunt, Highland Light Infantry, won the Albert Prize, which is open to match rifles, and was second in the Bass, a somewhat similar competition. On previous occasions frequent cases of hanging fire were complained of, but only one such is reported out of the many thousand shots fired at Bisley this year. Cordite was also accused with causing a rapid wear of the rifling, and this charge must have had some foundation as the Metford rifling has been abandoned in the weapons now issued, and replaced by a system devised by Mr. Rigby, which is stated to wear well and give more accurate shooting than either the Mannlicher, the Mauser, or the Lebel systems. Certainly the wear cannot now be a very serious matter; if reports from India are to be relied on, accurate shooting has been made even after the firing of some thousands of rounds. The weapon, indeed, is still serviceable after 8000 to 9000 rounds have been fired. Some further experience in its use will doubtless be gained during the Tochi punitive expedition, and it is of interest to note that on this occasion the new Dum-Dum bullet will be employed, that originally used having proved deficient in stopping power. In the Chitral campaign one man is reported to have been six times shot and to have nevertheless recovered. The private soldiers were accordingly losing confidence in their weapon. Returning to cordite, doubts have been thrown on its keeping properties, and it appears true that by using suitable means the nitroglycerine contained in it can be caused to exude, but there is absolutely no evidence that this exudation ever occurs under service conditions. The powder in question has been tested amongst the snows of Canada

and in the intense heat of an Indian summer, both of which experiences it has passed through without evidence of deterioration. On the other side of the question, cordite has some obvious advantages, as it gives very high velocities with low maxima pressures, and is exceedingly regular in action. The French, in their search for a smokeless powder, were, according to *Engineering*, less fortunate, as it is reported that this was completely changed three times within a couple of years, and owing to the secrecy maintained it is still not certain that the difficulties met with have yet been completely surmounted. The powder now used by them is very bulky compared with cordite, and thus necessitates the adoption of large cartridges and powder chambers.—*United Service Gazette.*

A NEW SYSTEM OF THROWING HIGH EXPLOSIVES.*

For a generation there has been a race for supremacy between guns and armor, between penetration and resistance, between offense and defense. This race has resulted in the development of cannon of comparatively small calibre, but with great thickness of wall and tremendous weight, in order to withstand the enormous pressures necessary to impart requisite velocities to long and heavy armor-piercing projectiles. Powder space within the armor-pierc.ng shell has been sacrificed to weight and strength of metal, reliance being mainly placed upon the smashing effect of a huge bolt of steel. Opposed to this we find the modern battle-ship, clothed in a wall of steel so ponderous as to reduce mobility to a minimum.

Now, with the advent of a system of throwing high explosives, in sufficiently large masses to render armor absolutely useless, we shall find navies discarding their armor, and everything will be made subservient to speed and mobility. This will work a complete revolution in the construction of ordnance and ships of war. Heavy ordnance, instead of being made, as at present, of small calibre, with thick and heavy walls, will be made of much greater calibre, and with comparatively thin walls. The projectile which will then be employed will be a thin shell, simply thick enough to support the mass of contained explosive in its flight from the gun; and the explosive will be sufficient in quantity to work infinitely more destruction upon any target than such projectiles as are at the present day thrown from heavy guns.

One of the requisites of primary importance to a system of successfully throwing high explosives in large masses rests upon the propelling charge—upon a suitable gunpowder—one which will give a sufficiently low initial pressure, and maintain that pressure behind the projectile in its flight throughout the entire length of the gun, and a powder which will, with absolute certainty, burn alike at all times under like conditions, in order that predetermined pressure and velocities may be depended upon.

* Digest of a paper read before the United Service Institution, London.

I first begun the investigation of the subject of high explosives and smokeless powders in England in 1889. Since that time I have built two powder mills in America, one for the manufacture of high explosives, the other for smokeless cannon powders. In connection with my other work on these lines, I conducted a large number of experiments for the Pneumatic Torpedo and Construction Company, of New York, formerly known as the Zalinski Pneumatic Dynamite Gun Company, looking to the production of a smokeless torpedo powder; that is a powder for the purpose of throwing high explosives, or aerial torpedoes, from ordnance.

The distinguished chemist Dr. Robert C. Schüpphaus has been associated with me in this work. He is also an inventor, and his extensive chemical knowledge and experience in connection with nitro compounds particularly qualified him for this work.

Owing to the shortness of range of the pneumatic guns, and to the expense, cumbersomeness and vulnerability of the plant necessary to operate them, it was determined if possible, to substitute gunpowder for compressed air.

How well we have succeeded in the Maxim-Scüpphaus smokeless powder to accomplish the desired results, and the special advantages that this powder has for the purpose, is one of the things which I shall here try to explain.

One of the great advantages of high explosives as an agency of destruction is the impossibility of opposing to them any efficient means of protection, when applied in large quantities. By the subdivision of the hull of the modern battle-ship into a honeycomb of water-tight compartments, and by surrounding it with torpedo netting, some protection is secured against attack from even the largest of present forms of torpedoes, such as the Whitehead, but the largest and latest type of these will carry but 200 lbs. of gun-cotton. It remains only to be able to attack with a sufficiently large quantity of explosive in order to render absolutely useless as a means of protection all precautions in the form of network and water-tight compartments. Five hundred pounds of gun-cotton exploded against the torpedo netting surrounding a modern battle-ship would insure her destruction, to say nothing of what would result from the explosion of still larger quantities.

The nearest approach to the system proposed by me for throwing high explosives that has yet been developed is the system of throwing them by means of compressed air. But the shortness of range of pneumatic guns, the difficulty and expense of protecting them, and the enormous plant of engines, boilers and air compressors necessary, are strong objections to their use for coast defense; while their cumbersomeness and vulnerability, together with the above objections render their employment on shipboard entirely out of the question.

With the 15-inch pneumatic guns that have been erected in the United States, at Sandy Hook and San Francisco, 500 lbs. of high explosive may be thrown a distance of about one mile and a quarter; 200

lbs. about two and a half miles; this is the maximum range. Hence a battle-ship could lie just beyond the range of these guns and destroy the entire outfit, without in turn being in the least exposed to the fire of the pneumatic tubes. It is obvious, therefore, that a practical system of throwing aerial torpedoes must have a range substantially equal to that of high-power guns opposed to it, and the quantity of high explosive thrown must be sufficient to effect upon the target greater destruction than can be effected by ordinary shells thrown from heavy ordnance.

Fig. 1 is a sectional view of my improved aerial torpedo and fuse, carrying half a ton of compressed wet gun-cotton. Fig. 2 is a 12-inch torpedo of the same pattern, carrying 250 lbs. of gun-cotton. The object of this invention is mainly to provide an aerial torpedo projectile which shall carry a maximum of high explosive with a minimum weight of metal, and at the same time be of such constitution, strength and integrity as to enable it to withstand the shock of acceleration and the

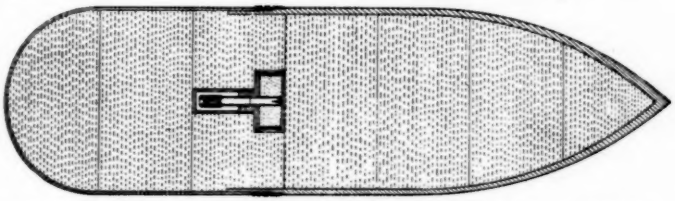


FIG. 1.—MAXIM AERIAL TORPEDO CARRYING ONE TON OF GUN-COTTON.

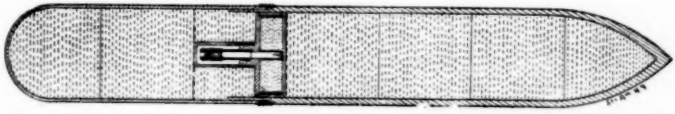


FIG. 2.—MAXIM AERIAL TORPEDO CARRYING 250 POUNDS OF GUN-COTTON.

pressure of the propelling gunpowder charge, without danger of disruption or distortion of the torpedo, or the premature explosion of it.

The torpedo projectile is preferably made in two sections, a forward and rearward portion, and joined together in the following manner: The forward portion is made somewhat thicker than the rearward, and the rear end of the forward section is reduced in thickness sufficiently to permit of the two portions being telescoped together, as shown in the drawing. The parts are made to fit closely, and are forced together with considerable pressure, in order to make a very tight joint.

To effect the simultaneous rotation of both portions of the torpedo, they are provided with interlocking projections or tongues, and a strong copper driving ring is shrunk or affixed on the projectile at the point of union of the two sections, and overlapping both portions, thus forming an efficient hermetical seal, while at the same time joining the two portions firmly together.

A very suitable high explosive for this torpedo is wet gun-cotton, previously highly compressed in a series of suitable moulds of proper size and shape, to adapt the cakes or blocks to closely fit a corresponding space in the torpedo. After the torpedo has been filled in the manner described, to such fullness as to prevent the rearward section being forced quite home upon the forward portion, or abutting against the thicker body of the forward section, the two ends are placed together, and the torpedo is subjected to considerable pressure in a longitudinal direction, sufficient to secure the maximum density of the contained high explosive charge. The gas check and driving ring is then affixed in the manner already explained.

When compressed gun-cotton is used for filling the torpedo in the manner described, its density and unyielding nature cause it to serve as a support to the walls of the projectile and prevent its disruption or distortion under the great pressure of gases of the gunpowder charge, and the sudden shock of acceleration, thus permitting the use of thinner walls than when filled with a more yielding material.

The walls of the forward section of the torpedo are made thicker than those of the rearward portion, in order to give greater weight to the forward end of the torpedo to secure a truer flight, and also such strength as to enable it to penetrate deck armor or earthworks before exploding.

Figs. 3 and 4 illustrate the position of the gun-cotton torpedo in the gun, as well as its size, compared with other forms of projectiles now in use, thrown from guns of half the calibre, but of greater weight, and of the same exterior dimensions from forward of the trunnions back to the rear of the gun.

The whole of the rearward section of the torpedo projects backward from the driving ring and ring seat into the powder chamber, so that the entire rear portion of the torpedo is surrounded by the gases of the propelling powder charge, which exert their pressure upon it simultaneously on all sides, causing the rearward section to move slightly forward and press hard upon the forward portion, thereby communicating the pressure of the propelling charge to the high explosive contained in the torpedo, which, from its great rigidity and density, is practically incompressible, and prevents the thin shell of the rearward section from collapsing.

It is obvious that insomuch as the torpedo extends backward beyond the driving ring into the powder chamber, it will be accelerated just so much more by the propelling gases, which give an increased velocity equivalent to a like lengthening of the gun.

The fuse employed is one adapted to explode when the torpedo shall have penetrated to a desired depth in water, earthworks, or the deck of a ship, its action being dependent upon a certain amount of retardation of the torpedo.

Fig. 4 shows, in section, a 67 ton built-up gun of 13½ inch calibre.

It shows how it is constructed from sixteen rings or layers of steel, shrunk upon one another. This form of construction and the enormous thickness of wall are necessary to withstand the enormous pressures employed, of 35,000 to 40,000 lbs. to the square inch. The gun shown in Fig. 3 is one designed by me for throwing aerial torpedoes. It may be made either from a single casting or a single forged steel tube. You will observe that the diameter of the gun from the rear portion forward one-half its length is the same as that of the 67 ton gun shown in the centre, but the calibre of the torpedo gun is 27 inches, twice as great as that of the 67 ton gun; the calibre being doubled at the expense of thickness of the wall, for the two guns, as shown, are of the same exterior dimensions for about one-half their length.

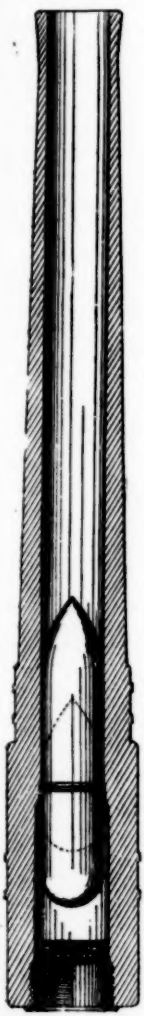


FIG. 3.—SECTION OF MAXIM 46-TON TORPEDO GUN, SHOWING TORPEDOES CARRYING HALF A TON AND A TON OF GUN-COTTON.

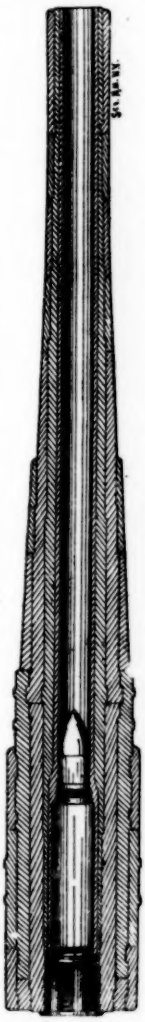


FIG. 4.—SECTION OF WOOLWICH 67-TON GUN WITH ARMOR-PIERCING SHELL.

We are enabled to double the calibre, and so materially reduce the thickness of the wall and lighten the gun by simply using a pressure of 10,000 lbs. instead of 35,000 to 40,000 lbs. This innovation is especially desirable in a torpedo gun, because we do not desire to shoot with an object to penetrate armor, and do not care for a flat trajectory; we desire only an equal effective range to other types of guns, and this rarely.

In the torpedo gun we have a calibre twice as great as in other guns, and consequently have four times the area at the base of our projectile. Therefore, with a projectile of equal weight, we can get a higher velocity with 10,000 lbs. to the square inch than can be attained with the high pressure guns employing 35,000 lbs. These calculations are based upon the assumption that

we have equal length of travel of projectile in the gun, and a pressure in both cases equally well maintained behind the projectile; but we have in favor of this torpedo gun and the torpedo projectile the great advantage that, for a gun of equal length, we get a materially increased length of travel of projectile, and by the employment of a pro-

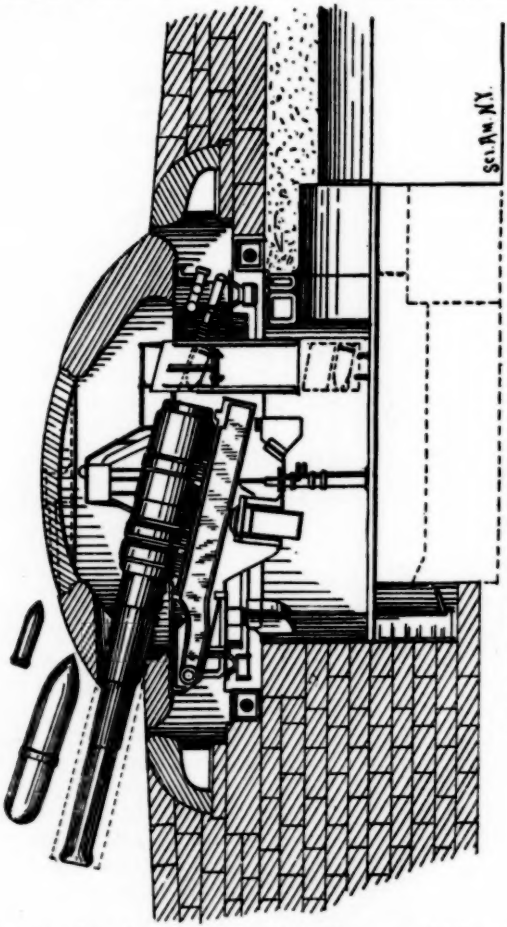


FIG. 5.—ELSWICK TURRET WITH GRUSON CUPOLA MOUNTING.

pelling gunpowder charge explained further on, which maintains the pressure practically the same to the muzzle, we are enabled to get a much higher velocity for equal weight of projectile than by the other system.

The projectile used in the British 12-inch wire gun is three calibres long, and weighs 850 lbs. With a propelling charge of 167 lbs. 8 oz.

cordite, and with a pressure of from 35,000 to 40,000 lbs. to the square inch, the projectile is thrown from the gun at a velocity of about 2350 foot seconds. In the torpedo gun at the top of the drawing is shown a torpedo projectile, carrying 1420 lbs. of picric acid. The total weight of this torpedo will be about 2700 lbs. With a powder charge of 167 lbs. Maxim-Schüpphaus torpedo powder, and a pressure of 10,000 lbs. to the square inch, and with a travel of projectile in the gun of more than seven and a half feet greater than in the wire gun, the torpedo projectile leaves the gun with an enormously greater energy than that of the projectile thrown from the wire gun; but as the projectile thrown from the wire gun has much greater sectional density than the torpedo projectile, it loses less velocity in overcoming atmospheric resistance. However, this is somewhat counterbalanced with the torpedo gun by a higher angle of fire, so that enormous quantities of high explosive can be thrown to a great distance. The torpedo projectile, carrying 1420 lbs. of picric acid, will leave the gun with a velocity of about 2000 foot seconds, with a range of nearly nine miles. The torpedo enlarged to the dotted

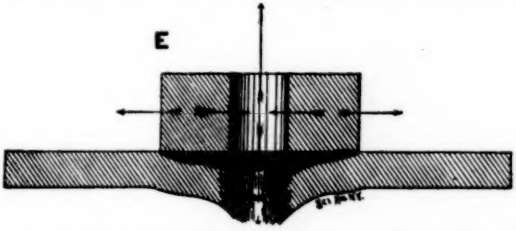


FIG. 6.—AN EXPERIMENT ON THE PHILOSOPHY OF EXPLOSIONS.

lines in front will carry one ton of picric acid, will have a velocity of about 1500 foot seconds, and a range of about five miles.

The total energy of projection imparted to each torpedo projectile will be practically the same. In the smaller, mass is sacrificed for velocity; in the larger, velocity for mass, so that the total energy of recoil of the gun will be practically equal for each projectile; but as there is somewhat more energy imparted to the aerial torpedo than to the projectile thrown from the wire gun, and as the guns are of equal weight, there will be slightly more recoil to the torpedo gun, but not enough to be a source of any practical difficulty.

To assist our imagination a little in its realization of the superior destructive energy of these torpedo projectiles above the common armor-piercing shell thrown from the high power guns of the present day, I will call your attention to Fig. 5, which is a section through an Elswick turret with Gruson cupola armor.

We can easily appreciate at a glance the superior efficiency of the torpedo projectile as a means of destroying these steel-inclosed bulwarks. The terrible concussion of the explosion upon or against the armored

protection, even if it did not totally demolish the steel wall, would certainly throw the gun out of action and kill all the gunners, to say nothing of the wreck it would occasion elsewhere, especially on board a battle-ship. It is hard to predetermine exactly the amount of damage which would be wrought by the explosion of half a ton of gun-cotton, to

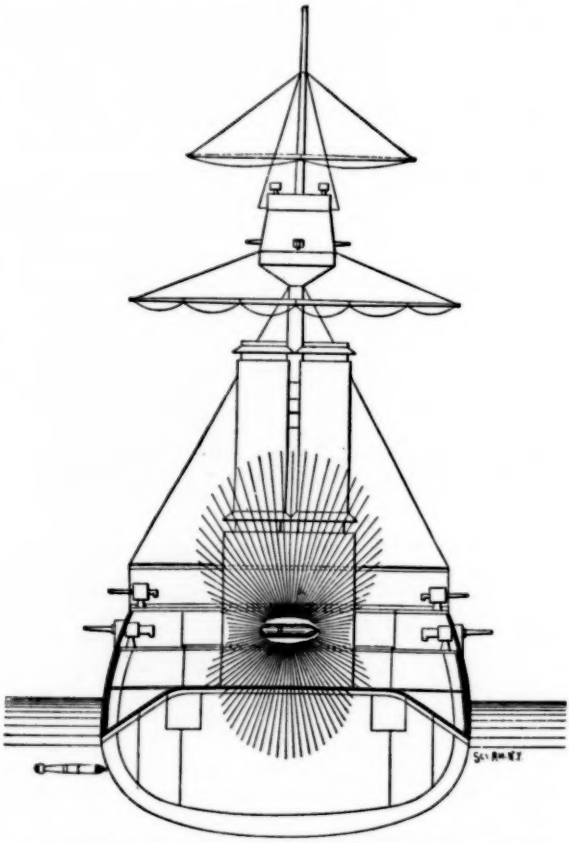


FIG. 7.—EXPLOSION ON BOARD OF A BATTLE-SHIP OF THE MAJESTIC CLASS OF A 24-INCH AERIAL TORPEDO.

say nothing of a ton, upon one of the turrets of a battle-ship, but the destruction, even though not fatal to the vessel, would be very extensive.

In Fig. 6 we have a very curious illustration, indeed, of explosive energy. A cylindrical body of compressed gun-cotton, with a hole through the centre, was placed on a piece of thin armor plate and deton-

ated; the waves of explosion moving in all directions, as indicated by the arrows, and meeting at the centre of the hole, are diverted in the direction of the vertical arrows, with greatly increased density and accelerated velocity, thus blowing a hole through the steel plate directly beneath where the hole was in the gun-cotton, the plate being simply indented beneath the solid portions of the body of the gun-cotton.

Fig. 7 illustrates the direction of the action of explosion of an aerial torpedo in its transit across the deck of a battle-ship. The explosive, being tamped by its own weight, and by the resistance of the surrounding air, will react upon the ship's deck with a disruptive effect similar to that of a torpedo exploded under water adjacent to the unprotected side or bottom of the vessel.

We will now extend our comparisons to other systems of torpedo warfare. Of the many types of torpedoes the most successful have been the Howell and the Whitehead. The Whitehead, standing in the lead, may, therefore, be taken as the best representative of what has been accomplished in locomotive torpedoes. The Whitehead is a perfect marvel of ingenuity, and the accuracy with which it will travel beneath the surface of the water and strike its target is wonderful. The first torpedoes of this type carried only 18 lbs. of dynamite. The quantity of explosive has been constantly increased, and the largest and most powerful to-day carry 200 lbs. of gun-cotton. I will enter into no description of the details or mode of operation of the Whitehead torpedo—a subject so well known—but Fig. 7 will illustrate the comparative sizes of the largest Whitehead torpedo placed alongside one of the 24-inch aerial torpedoes already described, carrying one ton of gun-cotton.

The tremendous difference in the quantity of explosive carried is very striking, and speaks for the vastly greater efficiency of the aerial torpedo.

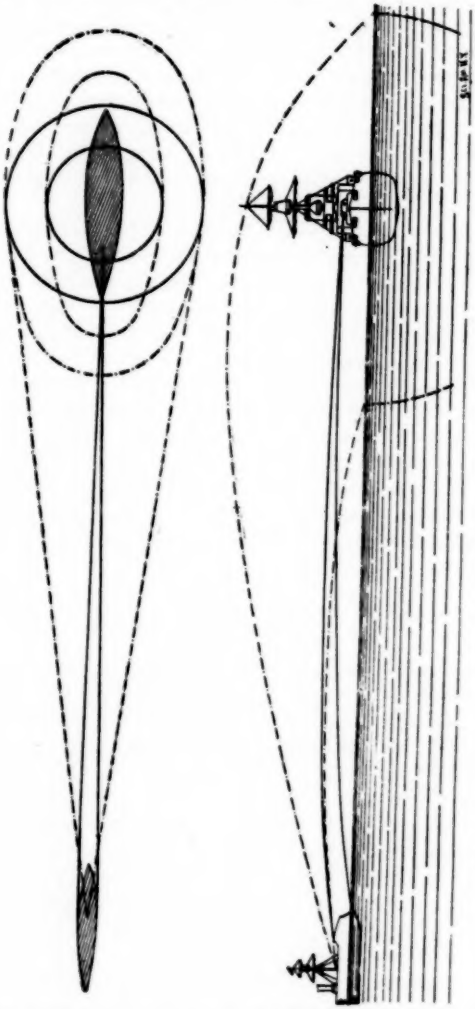
The maximum effective range of the Whitehead torpedo, carrying 200 lbs. of gun-cotton, is less than one mile, and less than one-fifth the range of the aerial torpedo carrying eleven times the quantity of high explosive. The efficiency of the aerial torpedo is, therefore, more than fifty times greater than that of the Whitehead.

After conducting a very large number of experiments, Gen. Abbot, of the United States Army, estimated a pressure of 6500 lbs. to the square inch, great enough to be fatal to a modern battle-ship; while Lieut.-Col. John T. Bucknill, in his book entitled "Submarine Mines and Torpedoes," concludes that a pressure of 12,000 lbs. to the square inch is necessary to inflict a fatal injury upon the hull of the strongest battle-ships now made.

Five hundred pounds of gun-cotton will be fatal, therefore, at a distance of about 38 ft.; maximite and picric acid, about 47 ft.; nitro-gelatin, about 54 ft.; one-half ton of gun-cotton, about 85 ft.; one ton of gun-cotton, 168 ft.; while a ton of nitro-gelatin would be fatal at 250 ft. As gun-cotton is the standard service high explosive in this country, I have

given special prominence in the table to the destructive range of this substance.

Figs. 8, 9 are intended to illustrate the destructive efficiency of the



FIGS. 8 AND 9.— COMPARISON OF DESTRUCTIVENESS OF A $500,000 CRUISER, WITH THAT OF A $5,000,000 BATTLE-SHIP.

blast of high explosives as compared with the smashing effect of the blow given by the bolts of steel or armor-piercing projectiles thrown from high power guns.

Fig. 10 gives an enlarged plan view of the deck of the battle-ship shown in Fig. 9, with numbers showing the areas of the zones of destruction within the circles drawn about the battle-ship.

The modern first-class battle-ship costs about $5,000,000. It carries an armament of four 12-in. wire guns, twelve 6-in., and eighteen 3 and 6 pounders, and five torpedo dischargers. Not more than one-half of the guns can be trained upon a single target at one time. Now, at an equivalent expenditure, we can construct and oppose to this ten torpedo cruisers, costing $500,000 each. This sum will construct a very respectable sort of craft, and one which will carry one 24-in. torpedo gun weighing 46 tons, and two torpedo mortars, weighing 20 tons each. The cruiser would fight head on, and the exposed portion could be protected

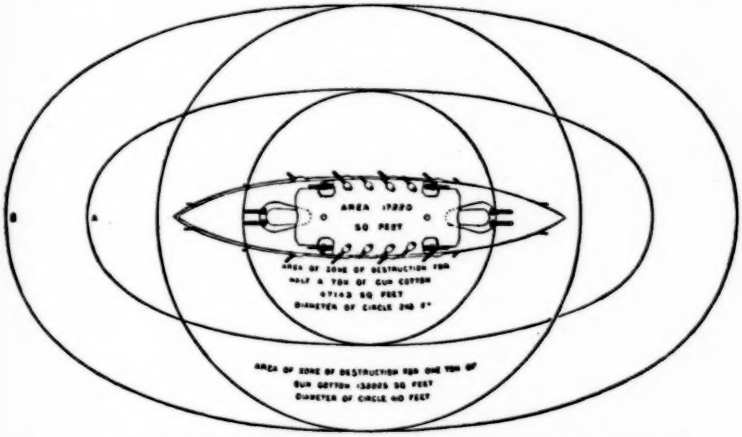


FIG. 10.— DECK VIEW OF BATTLE-SHIP MAJESTIC, SHOWING DESTRUCTIVE AREA OF AERIAL TORPEDO EXPLOSION.

by deflected armor, sufficiently thick to turn aside all shots thrown from a battle-ship except those from 12-in. wire guns. The torpedo gun would be capable of throwing half a ton of gun-cotton nearly nine miles, and one ton about five miles. Each mortar will be capable of throwing 500 lbs. four miles, half a ton about three miles, and one ton nearly two miles.

The size of the target presented by the cruiser fighting head on would represent an area about equal to her cross section above that portion protected by the water, while the target presented by the battle-ship to the cruiser would be in proportion to the quantity of high explosive thrown by the cruiser; and to give an idea of what this really means, there is shown on the right a modern battle-ship, and on the left a torpedo cruiser of the character just mentioned, pictured in the act of firing upon each other. The full lines drawn from the battle-ship to the cruiser show the

trajectory and angle of fire of the battle-ship, and also within what a limited angle the fire of the battle-ship must be confined in order to hit the cruiser at all. The dot and dash lines show the angles within which an aerial torpedo carrying a ton of gun-cotton would be fatal to the battle-ship, and the tremendous size of the target presented by the battle-ship to the torpedo cruiser. At the top of the drawing is a plan view showing the difference in the areas of the decks of the two vessels. Now, the battle-ship, in order to do any harm whatever to the cruiser, must, of course, make a hit, and to be fatal, that hit must be made in a vital spot, representing an area much more confined even than that represented by the deck of the vessel. As the cruiser would stand and fight with armored head on, the chance of a hit being fatal would be very small; while every torpedo, carrying from half a ton to a ton of gun-cotton thrown from the cruiser, and striking the area represented by the deck of the battle-ship, would at least throw the ship out of action, even if it did not sink her. But, in addition to this, we have the tremendous areas within which such quantities of high explosive, striking in the water, would be certainly fatal.

The lines drawn about the area represented by the deck of the battle-ship show the distances within which different quantities of gun-cotton would, according to the table, disrupt or crush the hull of the battle-ship. Half a ton of gun-cotton, striking anywhere within the space encircled by the line A, would exert upon the hull the required destructive pressure of 12,000 lbs.: and one ton within the tremendous area inclosed by the line B. But, as such a blow upon either end of the battle-ship, although crushing it, would not necessarily be fatal, on account of the transverse bulkheads and watertight compartments, I have drawn about the battle-ship two circles, representing distances within which half a ton and a ton of gun-cotton, respectively, falling, would exert upon the hull of the battle-ship a pressure of 12,000 lbs. in such proximity to her vitals as would be certainly fatal.

The cruiser would have a speed of from 20 to 24 knots, and could, therefore, choose her own position with respect to the battle-ship. Her tactics would not be like the ordinary torpedo boat, to dash into and run a gauntlet of destructive fire from the battle-ship, to drop a torpedo and away again out of range; but she would stand her ground and fight, always at a distance and in a position of her own choice, with armored head toward the battle-ship. In such position the target presented by the cruiser would be very small indeed, to say nothing of the difficulty of inflicting a fatal injury upon such a target with ordinary shot and shell.

The fatal area presented by the battle-ship as a target to half a ton of gun-cotton thrown from the cruiser is 47,143 sq. ft., and the fatal area presented to a ton of gun-cotton is 132,025 sq. ft., and it is a very safe estimate that the area exposed by the cruiser fighting head on would not be more than one two-hundredth as great as the fatal area exposed by

the battle-ship. Now, as every shot from the cruiser striking within the fatal area exposed by the battle-ship would destroy her, and as it would take a considerable number of hits from the battle-ship to sink the cruiser, it is very safe to offset the greater number of shots which the battle-ship could fire within a given time and the horizontal position of the target presented by her to the superior fatality of the shots from the cruiser. This enables us to very easily approximate the comparative efficiency of the two systems, by simply dividing the average fatal area exposed by the battle-ship by the area of the target presented by the cruiser. Now, as this area is contained in the area exposed by the battle-ship at least 100 times, one cruiser would be capable of destroying on an average, 100 battle-ships. But we can build ten such cruisers for what it would cost to build one battle-ship, and we must, therefore, multiply this efficiency by ten. This means that we could, for the cost of one battle-ship, produce a fleet of torpedo cruisers which would be capable of destroying 1000 first-class battle-ships.

These are, indeed, astounding figures. They are, nevertheless, based on such foundation in facts as to, at least, warrant our placing them in a category of practical probabilities.

In the choice of a high explosive for aerial torpedoes there are several desiderata, in addition to the mere force of the explosive. In the first place, it should not be so sensitive to shock or percussion as to be in the least endangered by the sudden force of acceleration exerted upon it in the gun. It must be perfectly stable and undergo no change by time and under varying conditions of temperature. It must be perfectly neutral, having no effect upon the metallic surfaces exposed to it. It should have as high a specific gravity as possible, in order to exert the maximum energy per unit volume. There is one more and very important desideratum, not possessed by any other explosive in like degree as by wet gun-cotton, and that is insensitiveness to detonation, not only from shocks of percussion, but shocks of ordinary forms of explosion. Gun-cotton can only be detonated by the explosion of a powerful detonative charge in direct contact with it.

Nitro-gelatin is the most powerful of commercial high explosives, but this explosive is too sensitive for employment in aerial torpedoes to be thrown from guns by gunpowder at high velocities.

Maximite is a title which was first applied to a high explosive invented by me and made according to my United States patent No. 554,-924. A stiff nitro-gelatin of the character of that just above described, consisting of about seventy to eighty parts nitro-glycerin and twenty to thirty parts of a very soluble variety of gelatin-pyroxylin, soluble in nitro-glycerin below 100° F., is frozen stiff and then cut into sawdust by a gang of saws, About seventy-five to eighty parts of this explosive sawdust is mixed and thoroughly incorporated with about twenty to twenty-five parts of finely pulped tri-nitro cellulose, the whole being saturated with water. The object of the fibrous tri-nitro-cellulose is to absorb and

hold water and lessen the sensitiveness of the compound. The compound may be packed into shells to a density of about 1.4, holding about 15 per cent. of its weight of water, the excess of the water being poured off.

Projectiles filled with maximite may be thrown from ordnance at service velocities with perfect safety. This compound will detonate under the influence of a strong exploder with all the violence of the original ingredients of which it is composed.

Picric acid is a very powerful high explosive, and when melted and cast it has a specific gravity of 1.7. It is highly insensitive to all ordinary influences and is, therefore, exceedingly well adapted for use in aerial torpedoes.

In view of the highly insensitive character of wet gun-cotton, and the fact that it is as powerful as No. 1 dynamite, to say nothing of the other high explosives just mentioned, it is hard to see the need of air guns if we have a suitable torpedo powder, by which low pressures can be had and maintained and projectiles with thin walls be thrown with safety.

In making a comparison between the system shown you to-day and that of the best system yet developed for throwing torpedoes by means of compressed air, erected at Sandy Hook and San Francisco, in the United States, it may be noted that the calibre of the largest of these pneumatic guns is only 15 inches, while its length is 50 feet and its weight 70 tons. Its maximum range with 500 pounds of high explosive is about a mile and a quarter. The pressure employed in the gun is only about 1000 pounds to the square inch—greater pressure than this having been found impracticable. —HUDSON MAXIM.—*Scientific American Supplement.*

Comment and Criticism.

"The National Guard National in Name Only."

Lieut.-Colonel Walter S. Frazier, Jr., Ill. National Guard.

COLONEL KING, the Iowa gentleman whose criticism of my article, "The National Guard National in Name Only," appears in the last number of the JOURNAL, is apparently so positive of the correctness of his position that it seems too bad to say anything in contravention, but as the growth of the new movement for a true National Guard is dependent largely upon our officers realizing thoroughly the inadequacy of the present system for educating and maintaining an efficient army reserve, it appears quite desirable that the incorrectness of my worthy *confrère's* reasoning be shown—not in a spirit of criticism but rather in one of friendly exchange of ideas.

I stated that "in none of the States is either the enlisted man or officer obligated by the terms of his enlistment or oath of office to serve the United States," and that under present conditions there would be no assurance that the benefits of existing company regimental and brigade organizations would inure to the advantage of the nation if the President should issue a call for troops, for the members of the Guard, which has no national status, have obligated themselves to serve the State, not the National Government, so that it must remain optional with every Guardsman, just as with every other citizen, whether or not he shall serve in the armies of his country unless drafted.

To this Col. King replies by quoting from the Iowa law as follows: "When a requisition shall be made by the President of the United States for troops, the Governor as Commander-in-chief by his proclamation shall order out for service the active Militia or National Guard of the State or such portion thereof as may be necessary: if the number is insufficient he shall order out the remainder," etc.

Now, there are just two methods known to civilized nations or sovereignties for securing the military services of men. One is by volunteer enlistment and the other through conscription or draft.

By precedent the United States is committed to the policy of calling for volunteers first when troops are wanted and of resorting to the draft only when the volunteers are insufficient in number for the service required.

With the two facts in mind, that the Iowa Guardsman has contracted to serve only the State of Iowa—his enlistment paper reads: * * * "that you will serve *the State of Iowa* faithfully in *its* military service," etc.,—and that it is the policy of the United States to raise its armies by volunteer enlistment if possible, let us pursue the matter a little further—

A reasonable interpretation of that part of the oath of enlistment, in which the man agrees to obey the orders of the Commander in-chief (the Governor) would seem to be that he bargains to obey such orders as relate to the military service of the State of Iowa. If Col. King quotes the law correctly in the

following clause: "or you cease to *become* a citizen thereof," the law is badly in need of correction. I fear that the Supreme Bench of the State would find it difficult to obtain any meaning from this combination of words.

It is clear that the Governor *must* "order out" the National Guard when a requisition for troops is made by the President, but where can he order them to go? What can he order them to do? He surely has no right to order them to enter Illinois or Missouri, or any other State, or to proceed to Cuba or the Klondyke region.

The Governor has clearly done his duty and gone to the limit of his power, as far as service in the armies of the United States, or in the National Guard of any other State is concerned, when he "orders out" the various organizations composing his command to assemble at Des Moines, or Burlington, or Council Bluffs, or any other point within the State. It must then remain optional with every officer and man unless drafted whether or not he shall enter the service of the Federal Government.

I cannot doubt that the Iowa National Guard is composed of as patriotic and capable officers and men as the Guard of any other State, and that the percentage of volunteers would be as high if the President were to issue a call for troops, but the stay-at-home will violate neither the spirit nor the letter of his enlistment in the Iowa National Guard.

Reviews and Exchanges.

The Elements of Law.*

THIS work, a volume of 173 pages of subject matter, is intended, as explained by the title page, to be an introduction to the study of the constitutional and military law of the United States. The author's declared purpose is to present so much and only so much of the elements of law and of the science of government as is necessary to enable one, not a student of law, to study intelligently the constitutional law of the United States and to understand and appreciate the serious duties and obligations of citizenship. An examination of the volume shows that the first four chapters treat of the State, the Legislature, the Executive and the Judiciary. The remaining nine chapters are brief topical analyses of certain branches of municipal law, and are principally devoted to explanation of property rights and of relations growing out of contracts, torts and crimes.

As indicated by the title page, the book was evidently written and, we believe, is used as a text-book for cadets at the U. S. Military Academy. In this sphere of its usefulness the work is a distinct effort to inculcate the underlying principles of municipal law. In the hands of a trained lawyer the work should be a text for teaching the essentials to correct analyses and logical conclusions in matters legal.

In the hands of the general reader it should be an aid to obtain a comprehensive view of his legal rights and obligations, as well as of the means by which they are preserved or enforced. H.

Extracts from an Infantry Captain's Journal.†

This work, which the editor of this series of books states in his preface, "is now presented for the first time to American readers, has been favorably known for some years in Europe," is one we have all seen quoted in various military works, and a few of our infantry captains have cause to remember it, as an order about five years ago at one of our military posts will evidence, as it directed them to study and follow the system there laid down in the instruction of their companies.

The main title does not convey to the mind the real subject of the work, which is so well stated in what might be called the sub-title, as "The trial of a method for effectively training a company in skirmishing and outpost duty in a limited time, and under unfavorable circumstances."

The subject is considered under two heads:

First, measures of safety on the march, and exercises of detail in skirmishing.

Second, outpost duty and combat manœuvres.

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* *The Elements of Law.* By Lieut.-Col. George B. Davis, Judge Advocate-General's Department U. S. A. John Wiley & Son, New York.

† *Extracts from an Infantry Captain's Journal.* By General Von Arnim. Hudson-Kimberly Publishing Co., Kansas City, Mo.

The first is divided into five exercises: 1. Advance against a supposed enemy; occupation of a position and defense against a skeleton enemy. 2. Training patrol leaders. 3. Detail exercises on broken ground. 4. Advance, with measures of precaution against a supposed enemy; occupation and defense of a position, as also retreat from the same, before a supposed enemy. 5. March and attack against a skeleton enemy; conduct of the advance guard when opposed to a retreating patrol; reconnaissance of the enemy's position by the advanced guard; attack, which the first time is repulsed, renewed the second time in another manner succeeds.

The second is divided into seven exercises: 1. Preparatory exercises in outpost duty, and conduct of a creeping patrol, and of a non-commissioned officers' patrol. 2. Outpost duty and attack of an outpost. The latter is driven back, reinforced, the assailant then retires. 3. Outpost duty and combat. A non-commissioned officer's post sent to the front is driven back on the outpost; the outpost defeats the attack of a force double its strength. 4. Exercise of patrollers, special conduct of creeping patrols in close ground. 5. Placing two outposts opposite one another with their patrols. Attack and defense of a defile. 6. Outpost exercise of one company against another. A great and small reconnaissance in day time. Night position and sending out of night patrols and non-commissioned officers patrols. 7. Defile fight of one company against another.

In addition there is an appendix containing: I. Sketch for exercising a company on very broken ground. II. Exercises which can be undertaken when the country on both sides of the road is cultivated, and there is only an opportunity of placing, at considerable distances apart, detachments under cover one opposite the other. III. Exercises which can be carried out on the same ground by changing the dispositions.

The editor of the series in referring to this work, again quoting from his preface, says: "It furnishes an interesting picture of the business-like nature of the company instruction in the German army * * *" also, "Incidentally the work shows us that even in the German army captains are unable to have always the full strength of their companies present for drills, and that some of the heart-burning annoyances of our own company commanders are felt in an army where the captains are given a degree of initiative unknown to our own."

The system is excellent, and the book is one that every infantry captain should be well acquainted with, not that he should strictly follow it out, especially when we remember that this latest edition was first published twenty-three years go, but use it in the manner so appositely stated by Colonel Maurice, as follows: "Changes will come, but the clock will not work backwards. The more rapid the changes, the more completely does the distant past, which cannot be recalled, cease to be an adequate standard for determining the preparation of armies for war—the more must we depend on a careful study of the conditions of the present applied to the collated experiences of past wars * * *"

It is unfortunate that the editor of the series did not include in this number the introductory remarks of the author, and of the translator, there is much in them that is of interest, and to a good book such things give a pleasant flavor to the whole work, by stating principles, making things more intelligible, and what is of more importance in this case, giving by inference a history of the work.

F.

First Aid in Illness and Injury.*

"Among the books written for the guidance of laity in the immediate treatment of medical and surgical emergencies this latest work is one of the best. Indeed, among many examined by the reviewer, there is none which contains so large an amount of accurate knowledge so clearly and succinctly stated. It covers a greater amount of ground than one could conceive to be possible within its comparatively small bulk, for it is a handy volume for the pocket." * * * writes a reviewer of this book in "The Annals of Surgery," and in this we are quite ready to agree with him.

The importance of a general knowledge of the steps to be taken immediately in order to prevent serious consequences from accident or injury is now everywhere recognized. The number of first-aid classes formed in civil life is continually enlarging; much interest in the subject has latterly been displayed in railway circles; the army has recently recognized the necessity for early aid to the wounded by the inauguration of a system of first aid instruction, which will enable every soldier in the service to apply temporary emergency treatment either to himself or to his comrade.

In order to keep pace with this growing interest, the author has carefully revised his former work and made numerous modifications in the text with a view to the attainment of greater clearness and precision. Like all works of natural growth this one possesses that excellence which comes from revision due to actual use.

The book contains about 300 pages. Eighty of these are devoted to the outlines of anatomy and physiology, admirable in many respects for fullness and simplicity of treatment. After this necessary preliminary matter come the 136 pages devoted to accidents and emergencies, constituting the animus of the book, the value of which is already known to the service. The volume ends with some useful information in regard to disinfection and ordinary sanitation.

We rather begrudge the chapter devoted to litter drill, and believe that the space might have been more profitably filled by a further expansion of this interesting first-aid material. The litter drill seems to us an attempt to apply the rigid exactitude and uniformity of the drill-ground to matters which do not submit themselves readily to this sort of treatment—a peace-time theory which a little of the rough-and-tumble experience of actual war will probably explode.

However, Dr. Pilcher is to be congratulated on having produced what has been declared by high authority to be "probably the best book on the subject yet published." C.

The Military Systems of Greece and Turkey.†

Hardly had the mutterings of the last European war made themselves heard before the Information Division had prepared, under the direction of its new head, Major Wagner, not only this complete account of the military systems of the two contestants, but also the maps, and clear description of the Græco-Turkish frontier which accompany them.

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* *First Aid in Illness and Injury*. By James E. Pilcher, M.D., Ph.D., Captain and Assistant Surgeon, U S. A. Fourth Edition. Charles Scribner's Sons, New York. 1897.

† *The Military Systems of Greece and Turkey*. Military Information Division, War Department, A. G. O., Number 14.

The enterprise of the Division was entirely adequate to the occasion, but the public printer interposed his own dispositions, and not until the war ended did the work appear, much to the disappointment of those whose promptitude had inspired the initial proceedings. The number opens with an introductory note containing a valuable list of the few works devoted to these subjects.

A detailed account of the army of Greece then follows, in which the organization, armament and instruction receive full and complete treatment.

A comparison of the rather meagre forces of this country with those credited to Turkey leads one to give credence to the statement made in one of the English monthlies that the Greek War Minister had mobilized his army in full hope that the Powers would step in at the opportune moment to prevent a war.

The interesting discussion and description of the frontier line affords a clear idea of those strategic reasons which decided the base and direction of the campaign on the part of the Turks.

As might be expected the Turkish army receives that treatment which its present importance would naturally call for. Commencing with a general statement of the extent and population of the country, the author enters upon a description of its civil and military administration, for both functions are not uncommonly found in the same person, at least in the higher divisions. The available war strength, conditions of service and expenditure show the effects of the German influences that have been at work of late years in remodelling these departments of administration.

Command, armament and instruction come in for their share of description, while the number closes with an account of the fortifications of Turkey, particularly those of Constantinople, concerning which the Belgian engineer, General Brialmont, was invited to advise in connection with a comprehensive scheme for the defense of the whole empire.

The entire number is replete with information, and Major Wagner is to be congratulated on being able to produce so complete and accurate an account at such short notice. B.

Military Map Reading, Field, Outpost and Road-Sketching for Non-Commissioned Officers.*

This little work of about seventy pages, on the subject indicated by the title is expressed in language that should be perfectly intelligible to any one holding the position of non-commissioned officer, for whose benefit it is intended.

The author has been for some years the instructor in Military Topography at the Infantry and Cavalry school, which added to his experience with troops should give him a thorough knowledge of the requirements necessary to give the desired information.

The idea of the work is the same as those of the series of what might be termed "The what to do, and how to do it," by Gale and Polden, gotten up however in better style, as to paper, binding, printing, plates, etc.

The subject is divided into two parts, 1st, Military Map Reading, 2d, Field, Outpost and Road Sketching, this being considered the "order of usefulness, as well as instruction for beginners, map reading is given the first place, for the

* *Military Map Reading, Field, Outpost and Road-Sketching for Non-Commissioned Officers.* By Captain W. D. Beach, 3d Cavalry. Hudson-Kimberly Publishing Co.

reasons that it is considered more important than map making, that it is more easily acquired and that 'map making' is but an application of its principles."

The matter is considered under the headings: An explanation of the difference between military and civil maps, a definition of the term, "map-reading," the points essential to a knowledge thereof, conventional signs, the scale, the points of the compass, simple methods of determining a true meridian, to ascertain the declination of the needle, uses of the compass, the forms of ground classified and shown by sketches, contours, what they are and what they show, two methods of determining the steepness of slopes, and their effect on the movements of troops, manner of studying a contoured map, study of maps on the ground, orientation of the map with and without the compass, also one's position on the map, field sketching, road and reconnaissance sketching.

As a rule instruments of some kind are supposed to be available, and while this work is good as far as it goes for one in whose "preparation constant effort has been made to treat the subject briefly, and at the same time clearly," yet another chapter might be added without sacrificing these qualities, giving some hints as to the best methods to be followed and attain good results when instruments cannot be obtained. J.

Announcement.

IN accordance with the rules and regulations adopted by the Institution regarding the submission of essays in competition for the annual prize, those for 1897 are required to be in the office of the Institution on or before September 1st.

Up to the time of going to press, essays have been received signed "Pro Bono Patria," "Titus," "Pardia," "Spes," "Fidus Achates."

Prize Essay of Infantry Society

FOR 1898.

"The Infantry of Our Regular Army; Its History, Possibilities and Necessities."

The conditions of the competition can be learned from the Secretary Infantry Society, Fort Leavenworth, Kansas.

The Military Service Institution.

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